Sustainability at the Urban-Rural Fringe

Assessing the implications of agriburban development for planning sustainable communities in the whitebelt of the Greater Golden Horseshoe

A Master’s Report submitted to the School of Urban and Regional Planning in partial fulfillment of the requirements for the degree of Master of Urban and Regional Planning

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Abstract

The growing public interest in local, organic food production and concern around environmental degradation has turned proximity to small-scale, organic farms into a value-adding amenity for residential development. As a result, agriculture-suburbs (or agriburbs) have emerged which incorporate residential, natural open space, and agricultural land uses in suburban development. These developments have been introduced into housing markets in the United States of America since the 1990s and more recently in Canada. The Greater Golden Horseshoe region in southern Ontario, Canada, contains a large amount of valuable agricultural land as well as intense growth pressure from its urban centres. The goal of agriburban developments, to balance conservation and development, is echoed in the provincial and regional policies that govern land use planning in this region.

This research examined previous case studies of agriburbs and reviewed land use policies for the Greater Golden Horseshoe to consider the implications of agriburban development for planning sustainable communities in this region. Conventional suburban development and new urbanist suburban development were also examined for comparison. An existing framework of sustainability assessment criteria was used to compare agriburban development with conventional and new urbanist suburbs. In parallel to this comparison, an inductive analysis was conducted of the Provincial Policy Statement, the Greenbelt Plan, and the Growth Plan for the Greater Golden Horseshoe.

The findings of this research indicate that none of the three approaches are completely effective at providing an appropriate mix and range of housing. Additionally, the benefits offered to residents by new urbanist neighbourhoods are perceived by the general public to be outweighed by the detriments of higher density. The result is that the majority of homebuyers prefer conventional suburbs. Finally, this research indicates that the dual objective of conservation and development is self-contradictory at the site-level and is more effectively addressed at the regional level described in the provincial and regional land use policies. These policies require that planning matters related to population growth, natural heritage and resources, and housing to be approached in a coordinated and integrated manner. Agriburbs produce inefficient development while impacting a greater amount of land and resources than other suburban developments. This approach does not support the policy objectives of developing sustainable communities in the Greater Golden Horseshoe. However, there may be specific locations along the fringe of agricultural land preserves where the implementation of agriburbs could reduce land use conflicts between intense residential development and large-scale agriculture operations.

Areas for future research include site-specific policies for the appropriate application of agriburbs, incentives for suburban developers to incorporate affordable housing, and education to address the contradictory desires of homebuyers and to increase the desirability of new urbanist suburbs.
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Introduction
“In recent years there has been much concern at the rate at which Canada’s urban areas have expanded, not merely in population terms, but from the point of view of low density and often wasteful development on surrounding agricultural land.”

– H. J. Gayler, 1982

1.1 Overview

Despite having been written more than 30 years ago, the words of Gayler still accurately represent the present day concern regarding the impact of urban expansion on prime agricultural land in Canada. Criticisms of urban sprawl emerged as early as the 1960s, however, the “low density and often wasteful development” that occurred in the post-war decades has continued largely unrestricted in most of the nation’s urban areas. The impact of urban expansion on farmland is of particular concern in southern Ontario which contains a significant amount of the most viable agricultural land in Canada and strong development pressure from urban population growth. Recently, however, planning policies of the Ministry of Municipal Affairs and Housing and the Ministry of Infrastructure of Ontario have taken steps to encourage intensification of existing built-up areas and to slow urban expansion and greenfield development, particularly in the Greater Golden Horseshoe of southern Ontario (identified below, in Figure 1). The protection of viable agricultural land that is close to cities plays a crucial role in reducing urban sprawl, promoting compact development, and facilitating local food production (Daniels, 2011).

This research compared the agriburb, a recently emerging approach to suburban development, with conventional and new urbanist suburbs in a sustainability assessment. Additionally, provincial and regional planning policies that direct conservation and growth in the Greater Golden Horseshoe were the subject of an analysis focused on agricultural land management and residential development. The findings of this research provide insight on the conflicting demands of urban expansion and agricultural land preservation within the Greater Golden Horseshoe in southern Ontario, Canada.
1.2 Balancing Conservation and Development

In 2005, the urban designer and planner Andres Duany commented that “agriculture is the new golf” in reference to a study that demonstrated homebuyers would pay equally high premiums for views of a working farm as they would for views of a golf course (New Urban News, 2006). Academic sources have further examined the growing trend for farms and natural space to act as value-adding amenities to suburban developments (see Asabere, 2012; Lambert et al., 2011; Pejchar et al., 2011; and Grooms, 2010). In a small portion of greenfield developments in Canada and the United States, a new approach to suburban planning aims to accommodate population growth while preserving agricultural land or other natural amenities. The resulting neighbourhoods, which feature a combination of agricultural and residential uses, have been dubbed “agriburbs” (for agriculture-suburb). Numerous agriburbs have been produced in the United States in an effort to reduce the environmental impact of urban expansion and offer an alternative to monotonous suburbs. Proponents of the approach claim that it offers opportunities to connect people to natural spaces, sustainable food sources, and food production education opportunities (Prairie Crossing, 2009). These claims suggest that agriburban development could
be a valuable planning tool for areas where demand for urban expansion conflicts with the need to preserve local agricultural land. However, criticism has also been raised in opposition to this form of development. Opponents have suggested that the combination of residential and agricultural uses results in communities that are less dense than conventional suburbs; meaning that even more land is lost and the developments demand higher public investment to service. Other skepticism for agriburb effectiveness is based in the historic trend of adjacent agricultural and residential uses creating conflict between homeowners and farmers due to issues of odours, noise, and health concerns.

Smart growth has been widely accepted by planning professionals in Canada and the United States as a preferable alternative to the development patterns that have dominated since World War II. A key aspect of the discussion around preventing sprawl is the need to preserve prime agricultural lands near settlements areas. Similarly, Ontario’s planning policies encourage infill and intensification, specify requirements for greenfield development, and restrict the expansion or urban boundaries. Meanwhile, agriburbs are increasing in popularity as farms have become value-adding amenities for residential developments. A chief argument made in favour of agriburbs is their contribution to the preservation of peri-urban agricultural lands. However, due to their recent development, literature on agriburbs is limited and opinions are mixed on whether they can achieve their claims. Do agriburbs offer an efficient and effective means of preserving agricultural land? Do they facilitate the levels of transportation and infrastructure efficiency aimed for in smart growth? How agriburbs will contribute to the overall sustainable development of a region has yet to be explored.

1.3 Research Objective

This research will aim to address this gap in knowledge by examining agriburban, new urbanist, and conventional suburban neighbourhoods in a comparative assessment. Through a review of the provincial and regional planning policy framework for the Greater Golden Horseshoe, conclusions will be made regarding the implications of agriburban development in this context. It is hoped that this research will provide valuable insights to planners engaged in suburban planning and seeking development approaches that contribute to sustainable development.
To this end, the following questions will be addressed:

- How do agriburbs compare with conventional and new urbanist suburbs according to sustainability assessment criteria?
- What are the implications of these findings for planning sustainable communities at the urban-rural fringe in the GGH?

1.4 Report Outline

In Chapter 2, this report presents the findings of a literature review and provides information on past and current approaches to growth management, peri-urban development, and agricultural land preservation. Following this, Chapter 3 describes the research methods used to conduct this research. The assessment used to evaluate different approaches to suburban development is summarized in Chapter 4, while the detailed evaluation is attached to this report in Appendix A. Similarly, Chapter 5 presents a description of the planning policies reviewed and a summary of the findings while Appendix B, also attached, lists the relevant policy sections in more detail. Finally, findings from the sustainability assessment and policy review are synthesized and, from these findings, conclusions regarding the research questions are put forward in Chapter 6.
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Background
In his book, “From Sprawl to Smart Growth” (1999), Robert H. Freilich describes how careful planning at the urban-rural fringe is essential for the well-being of a city’s urban core and established neighbourhoods. In his words: “what you do on the ‘outside’ will have more impact than all the programs since World War II to revitalize cities and older suburbs from the ‘inside’” (Freilich, 1999, xix). The following chapter draws on books, academic articles, and news media to examine progress in peri-urban development (i.e. that at the urban-rural fringe) and its impact on our cities, food production, and the environment. This chapter describes conventional suburbs and the negative environmental impacts of sprawl. Agriburbs, which have been proposed to address the shortcomings of conventional suburbs, are discussed and consideration is given to the planning context of the Greater Golden Horseshoe which is characterized by urban growth pressure and valuable agricultural land.

2.1 Sprawl: The Challenge and Attempted Solutions

2.1.1 Emergence and Dominance of Sprawl

The 20th century is generally perceived to have continued the trend of urbanization that began in the late 19th century. This is something of a misnomer, however, as much of the growth of cities that occurred in Canada and the United States took place in the form of suburbs at the urban-rural fringe. Particularly in the postwar era – as a result of the proliferated private automobile, public investment in highways, and federal policies to increase home ownership affordability – peri-urban living was appealing and accessible (Gordon & Janzen, 2013; Freilich, 1999, 2). As local governments faced expensive reparations of their deteriorated downtowns, each one acted in its own (albeit, short-sighted) best interest and encouraged growth outward into the seemingly infinite countryside. The resultant patchwork of large-lot, single-detached homes over top of previous farms, forests, and wetlands has been dubbed “urban sprawl.” Urban sprawl is defined as “an unfettered form of urban expansion which is characterized by the initial nonuniform improvement of isolated and scattered parcels of land located on the fringes of suburbia, followed by the gradual urbanization of the intervening undeveloped areas” (Freilich, 1999, 30).
Despite having been questioned for its negative impacts since as early as the mid-1960s (Whyte, 1964, 8), the conventional (or “post-war”) suburban neighbourhood design that is characteristic of urban sprawl has remained the predominant approach. While some suggest the approach is perpetuated by zoning and tax policies (Freilich, 1999), these neighbourhoods are demonstrated to be highly desirable to the majority of the population (Morrow-Jones et al., 2010; Talen, 2001).

The low density and increased privacy of conventional suburban neighbourhoods is both the reason for their popularity and a generator of significant criticism. Urban sprawl contributes to significant planning issues including the destruction of the environment, overconsumption of fossil fuels, traffic congestion, irreversible conversion of agricultural land, unaffordability of housing, infrastructure deficiency, and urban deterioration (Freilich, 1999, 16). Sprawl has also been opposed for its costs to public health by contributing to low levels of physical activity, increased quantity and contamination of stormwater runoff, and general lack of sense of place (Frumkin et al., 2004, 8; 131; 21). However, while alternative built environments can enable active transportation amongst those with a preference for it (Handy et al., 2008; Frank et al., 2007), some suggest that residents with a preference for driving will continue to do so regardless of the form of their neighbourhood (Frank et al., 2007). Others suggest that physical activity levels are equal in the different environments, with the difference being that activity takes place in conventional suburbs for leisure purposes rather than for utilitarian ones (Rodriguez et al., 2007). Disagreements aside, it is generally accepted that conventional suburbs necessitate trips to be made by automobile that some residents would choose to otherwise make by active modes (Witten et al., 2010; Handy et al., 2008; Frank et al., 2007; Rodriguez et al., 2007; Khattak & Rodriguez, 2005). In addition to its detrimental influence on physical health, sprawl has been demonstrated to have negative social impacts. The privacy afforded to homeowners, which may be the primary draw of such neighbourhoods, is suggested to lead to social isolation and less political participation, donations, and volunteering (Freilich, 1999, 22). Finally, the automobile dependency and social isolation enforced by sprawl have also been associated with the increasing occurrence of depression, anxiety, and attention deficit hyperactivity disorder (Frumkin et al., 2004, 159-160).
2.1.2 Alternatives to Urban Sprawl

In response to the previously-listed criticisms, alternative suburban development approaches to sprawl have been conceived. At the level of site development, alternatives to the homogenous and destructive automobile suburb include new urbanism, low impact design, and cluster development. At the regional level, smart growth has been proposed as a means of repairing our cities and preventing further sprawl.

Planning Better Neighbourhoods

New urbanism is a recent approach to urban planning which recalls town planning approaches that preceded the automobile. Its defining characteristics are the mixing of employment, residential, and commercial land uses to bring work, home, and play within walking distance; and intensification around nodes to support public transit (Grant, 2007; CNU, 2001; Duany & Plater-Zyberk, 1994). New urbanist proponents view it as a remedy to the ailments of sprawl, claiming that it produces neighbourhoods that are healthier for residents and have less negative impact on the environment. One way this is achieved is through the facilitation of alternative modes of transportation; which leads to increased physical activity as well as independence for those who cannot or choose not to drive (Handy et al., 2008; Frank et al., 2007; CNU, 2001; Duany & Plater-Zyberk, 1994). A case study comparing new urbanist and conventional suburbs in Markham, Ontario, found those with new urbanist designs had higher gross densities and required the conversion of less agricultural land (Gordon & Vipond, 2005). New urbanist principles also aim to concentrate density around transit stops to support transit service (CNU, 2001; Duany & Plater-Zyberk, 1994). This density is purported to be achieved, while simultaneously increasing social diversity and housing affordability, through a more diverse housing stock including apartments and townhomes (CNU, 2001; Duany & Plater-Zyberk, 1994). However, a study of 152 new urbanist developments in the USA found that, while many incorporated a mixed housing stock, only 15% were affordable for a resident with the median area income (Talen, 2010). This was echoed in an analysis of Kentlands, Maryland; a highly-regarded new urbanist neighbourhoods, which did not have a sufficiently varied housing stock to be affordable to lower-income households (Southworth, 1997). It has been suggested that housing affordability of new urbanist suburbs is worsened still by the low supply of these
alternative neighbourhoods, which fails to meet the demand for them (Morrow-Jones, 2010; Zimmerman, 2001). This is supported by evidence that as the number of new urbanist neighbourhoods in an area increase, they become more affordable (Stratton, 2009).

Low impact development (LID) describes another development approach which focuses on the hydrological cycle to lessen the impact of urban development on the environment. LID uses permeable paving materials, bioremediation, and on-site collection and redistribution of water to reduce the quantity and toxicity of urban storm water runoff (van Roon, 2007). While LID does not directly offer variation from sprawl with the proximity of amenities or the transportation behaviours of individuals, it reduces the environmental impact of development, which is a commonly cited argument against higher densities. According to the United States Environmental Protection Agency (USEPA; 2015), LID principles and features can be applied in new development, redevelopment, and retrofits to existing development. As such, the approach has been utilized in a range of settings in Canada and the United States since its conception in 1990 (USEPA, 2015).

Specifically intended for peri-urban development in greenfield areas, cluster development offers another alternative to conventional suburbs. Initially proposed by William H. Whyte, cluster development is intended to achieve more liveable communities while having a reduced environmental impact. This is accomplished by allocating less private space (using small lots or town houses) and concentrating housing in a portion of the site while maintaining a significant percentage as public open space (Whyte, 1964). Cluster development has been found to have a net-positive impact on home values as buyers view the benefit of open space to be greater than the downside of increased density (Asabere, 2012).

It is worth noting that, although cluster development was originally proposed to produce higher density neighbourhoods than conventional suburbs, “clustering” has also been used in reference to large-lot, rural developments with much lower density (for example, clusters of one-acre lots as opposed to dispersed five- to ten-acre lots; Lenth et al., 2006). In such cases, clustering is used in an effort to reduce the environmental impact of the more dispersed alternative. However, research has found that these low-density clusters have conservation value
more similar to dispersed development than to that of undeveloped land as a result of the introduction of non-native species and the fragmentation of preserved land (Lenth et al., 2006).

Debate continues around the causality and ethics of the built environment: can and should planning professionals design neighbourhoods that require people to live in a way that is healthier for them and impacts the environment less? Or are the only differences in social interaction and physical activity the result of more active and environmentally-conscious people choosing neighbourhoods that facilitate their preferences? Despite this debate, planners are generally united in their support of alternatives to urban sprawl. Even if the profession cannot influence behaviour, it should at least provide residents the freedom to choose healthy ones.

Nonetheless, popular opinion has not grown with that of the professionals. While the demand for new urbanist and other alternative neighbourhoods appears to exceed their current supply, they generally remain less desirable than conventional suburbs (Morrow-Jones et al., 2010; Talen, 2001). The dominant factor in this preference is the lower density of conventional suburbs. However, studies have also found consumer preferences to be self-contradicting; such as stating desire for lower-density and proximity to farmland while also maintaining shorter commutes (Morrow-Jones et al., 2010) These findings suggest that public education will play an important role in encouraging their implementation (Morrow-Jones et al., 2010; Talen, 2001).

Planning Better City Regions

As a result of their limited success, such alternative approaches have yet to produce real improvements in land conservation or transportation patterns because they have generally been implemented in isolation as opposed to on a regional scale (Southworth, 1997). Smart growth addresses the negative aspects of sprawl with development policies at the regional level. Freilich, a planning lawyer instrumental in the emergence of smart growth, defines its two major concepts as follows (1999, 30):

1. “Controlling patterns of development into transportation corridors, centers, contiguous development, and neotraditional mixed-use developments”
2. “Requiring that new development pay for its one-time fair share of new capital costs, to incentivize growth in existing built-up areas and encouraging joint public/private investment to stimulate economic development”

The system described by Freilich responds to the haphazard, market-driven nature of sprawl and allows municipal and regional governments to guide development in a more sustainable manner. Although smart growth can be employed through a range of mechanisms, the common features it yields include enhanced sense of community, stable neighbourhoods, a predictable development process, environmental protection, flexibility and profit for developers, decreased congestion from use of alternative modes, and more efficient use of public money (Freilich, 1999, 32). Ultimately, promoting smart growth is implied to be an effective means of containing sprawl and, in doing so, creating sustainable communities (Freilich, 1999, 30).

As with new urbanism, the discussions of smart growth are not absent of criticism. Limiting the development of new land leads to rising property values within the urban boundaries – a trend that affects current homeowners positively but generates opposition amongst prospective first-time buyers (Downs, 2007). Integration of a range of smart growth policies is also essential to successfully achieve its goals while overcoming opposition. In Portland, Oregon, for example, the rise in property values that resulted from the introduction of firm urban growth boundaries has been balanced with a shift towards more dense housing styles (Downs, 2007). The result is that costs per dwelling unit have remained relatively constant (Downs, 2007). However, when such policies are implemented without proper coordination, lower-income groups can be priced-out of many neighbourhoods (Kunstler, 2002). In the Greater Golden Horseshoe, an area surrounding Toronto, Ontario, the Greenbelt Plan was introduced in 2005 to limit sprawl and preserve agricultural viability and natural heritage. Some suggest the regional approach has not been well-balanced, as significant increases in property values have occurred since the introduction of the Greenbelt Plan and housing affordability in the region has been reduced (Curtis, 2014).
2.2 Development and Farming

2.2.1 Public Desire for Local Food Production

In recent years, people around the world have begun to give more consideration to their food. Increased attention has been paid to the nutritional value of our diet in response to escalating obesity and other diet-related illnesses (Winson, 2010). Additionally, light has been shed on the means of production, transportation, and preparation of our food (Seyfang, 2006). As public awareness grows, individuals have begun to seek food that is fresh, ethically-produced, and has minimal impact on the environment. This often leads consumers to local, organic producers.

This movement has begun to impact residential development as views of working farms and access to fresh produce have been seen as value-adding amenities. One area in which this has been reflected is the replacement of the archetypal golf course development (Grooms, 2010). As popularity in golf decreases, and developers and consumers increasingly prioritize sustainability, developers have sought alternative amenities that suit denser and less impactful developments (Grooms, 2010). Such alternative amenities include open space preserves and organic farms. The resurgence of the farm as an idyllic residential setting was portrayed in a popular quote by architect and urban planner, Andres Duany, who stated that “agriculture is the new golf” (New Urban News, 2006). One study, which presented homeowners with two alternatives for the hypothetical conversion of a nearby land parcel, found that farming was generally preferred to residential use (Lambert et al., 2010). The most significant reasons for the decision were reduced water consumption and traffic congestion with the farming operation, while habitat preservation and improved air and water quality were also considered benefits (Lambert et al., 2010). In another study, proximity to agricultural land was found to be an important factor in the consumer desirability of a neighbourhood that could outweigh perceived drawbacks associated with higher density (Morrow-Jones et al., 2010).

2.2.2 Impact of Urban Expansion on Agricultural Land

A significant environmental and economic consideration of low-density, urban expansion is the destruction of greenfield areas at alarming rates. Of particular concern in North America is the prime agricultural land surrounding many rapidly growing cities. Historically, North
American settlements were often located in proximity to prime agricultural lands. As these towns and cities have grown, they have had a substantial impact on the environment and limited or nullified the agricultural potential of the land. In a country as expansive as Canada, it can be difficult to perceive land as a scarce resource. However, only five percent of the nation’s land is considered dependable agricultural land (Hofmann, 2001). While the province of Ontario contains less than a fifth of this land, it contains half of the most valuable classification of agricultural land in Canada, Class 1 (Hofmann, 2001). As a result of the growth of urban areas in Toronto, the amount of the province’s Class 1 land that has been consumed for urban land uses increased from 13% in 1971 to almost 19% in 1996 (Hofmann, 2001). Today, the Greater Golden Horseshoe remains the most significant contributor to new settlement areas on dependable agricultural land in Canada (Statistics Canada, 2014). Population growth and urban migration trends suggest cities will have to grow more (either in area or in density) to accommodate future populations.

The financial viability of farms is also a growing issue. With decreasing crop values, farmers are forced to find more efficient means of working larger areas, or else focus on niche markets such as organic produce or other specialty crops. The result is an increase in the number of large-scale, commercial farms and small-scale, niche farms but a decrease in the number of medium-scale family farms (Daniels, 2011). At the urban fringe, high property taxes add further pressure on farmers and decrease the viability of farmland. Since property taxes are typically based on the highest-value potential use, as opposed to the existing use, it is unfeasible to continue using land for agriculture once it is rezoned to permit development (Lambert et al., 2011).

As cities expand and agricultural lands are repurposed, the productive potential of this land is often completely lost. Each parcel of farmland that is converted also impacts adjacent parcels, which will be affected by changes in property taxes as well as nuisance claims by nearby residents (Brabec & Smith, 2012). These nuisance claims can relate to noise from machinery, odour from livestock or manure spreading, and concerns around herbicide and pesticide use. Ironically, it is often the same residents who chose a peri-urban neighbourhood for its proximity to the countryside who file nuisance claims and attempt to impose restrictions on farming.
operations (Kilgannon, 2007). If implemented, these restrictions further reduce the viability of the farmland and increase its likelihood to be developed, thus taking away the amenity that drew those residents. However, recent findings suggest that smaller-scale, organic agriculture can be compatible on lands adjacent to both residential and large-scale agricultural uses (Newman & Nixon, 2014). At a smaller scale, these operations do not generate significant noise and odours; and organic farms pose fewer health concerns due to the lack of herbicide and pesticide use. At the same time, smaller-scale farms do not generate nuisance claims with neighbouring large-scale operations. In this way, they can function as an effective buffer to prevent conflicts between residential and large-scale agricultural uses (Newman & Nixon, 2014).

2.2.3 Approaches to Agricultural Land Preservation

For much of the 20th century, local, regional, and federal governments in Canada and the United States trusted that a relatively uninhibited land market would produce desirable land use schemes. Instead, the result was large swathes of residential and commercial sprawl which destroyed wildlife habitats, wasted land, and provided little public space (Daniels & Lapping, 2011). Far from being prevented, such development was facilitated by federal and local government policies which made housing ownership easier and encouraged development with the hope of creating economic stimulus and increasing the property-tax base (Freilich, 1999, 2; Gordon & Janzen, 2013). Unfortunately, this was a misinformed perspective – in fact, the opposite is true. With far less infrastructure required, farming generates more in property taxes than it costs in public expenses; meanwhile, residential development demands more in services and infrastructure than it generates in property taxes (Daniels & Lapping, 2011; American Farmland Trust, 2007).

Farmland preservation has been shown to play an important role in limiting sprawl, reducing public expenditures, and promoting more sustainable development (Daniels, 2011). It also facilitates local production of food which is being perceived as increasingly valuable as transportations costs increase (Daniels, 2011). However, farmland preservation is half of the equation. The other is to incentivize redevelopment and intensification within the built area and on desired greenfield areas to produce liveable and sustainable communities (Irwin et al., 2003). Effective growth management will use both tools – “pushing” development away from
agricultural land and “pulling” it toward desired areas – to plan for development as well as conservation (Daniels & Lapping, 2011; Irwin et al., 2003).

In Ontario, the Ministry of Municipal Affairs and Housing (MAH) and the Ministry of Infrastructure (MOI) are using “pushing” and “pulling” measures to preserve farmland and promote sustainable development. Policies such as the Provincial Policy Statement (MAH, 2014a), Growth Plan for the Greater Golden Horseshoe (MOI, 2013), and Greenbelt Plan (MAH, 2005) have taken steps to encourage intensification while slowing urban expansion and greenfield development, particularly in the Greater Golden Horseshoe (GGH). Regional land preservation strategies such as these have been found to be more effective than clustering development at a smaller scale, which results in less land being preserved and what is preserved being in a more fragmented state (Brabec & Smith, 2012). These findings suggest that larger agricultural parcels that are adjacent to other farmland are more financially viable and less likely to be converted to other uses (Brabec & Smith, 2012). Additionally, in contrast to an uninhibited land market with easily amended land use regulations, land preservation approaches produce greater permanence for agricultural uses (Daniels & Lapping, 2011).

Despite this progress, the development of greenfield areas to accommodate residential neighbourhoods continues across Canada and the United States, including within the “whitebelt” of the Greater Golden Horseshoe – that is, the greenfield region between existing urban areas and the protected countryside of the Greenbelt. With a periodic review of the Greenbelt Plan taking place in 2015, there is pressure to permit further development within the Greenbelt to relieve housing and transportation pressure (Curtis, 2014). However, while disagreements continue between anti-growth and pro-growth advocates on exactly what “smart” growth is, land preservation is generally accepted as a key issue (Daniels & Lapping, 2011).

2.2.4 Balancing Demands: Agriburban Development

Effective smart growth policies incentivize desirable development while preventing environmental destruction, social inequity, and unsustainable public expenditures. However, some suggest that many policy approaches address conservation and development as two separate issues, as opposed to one, integrated issue – that is, sustainable development (Chapin & Coutts, 2011). In response to this perceived shortcoming, alternative forms of suburban
development have been proposed to balance the need to preserve agricultural land with that of providing new housing. These approaches combine elements of new urbanism and cluster development with the goals of agricultural land preservation into the design of neighbourhoods that combine residential and agricultural land uses. Such neighbourhoods are often referred to as agriburbs (for agriculture-suburb). In some instances, they are also referred to as conservation developments; though this generally describes a regional approach to land use planning that places priority on environmentally significant areas. A parallel approach to agriburbs, called agrarian urbanism, similarly integrates agriculture with other land uses.

The agriburb is an alternative form of suburban development that is growing in popularity in North America. Agriburbs combine new urbanist design principles with a desire of residents to feel “closer” to their food. These neighbourhoods contain a mix of residential and agricultural land uses and sometimes contain a small commercial area concentrated around a public amenity such as a hall or market. Developers of agriburbs such as Prairie Crossing, located outside Chicago, claim that such communities give residents a stronger connection to farming and food, easier access to healthy food and physical activity, and excellent community life (Prairie Crossing, 2009). These developments often incorporate conservation in early stages of their design which facilitates the protection of key natural and cultural landscapes while providing residents with outdoor recreation opportunities and educational experiences with agriculture (McMahon, 2010; Apfelbaum et al., 1996). An additional benefit offered through conservation is natural stormwater management services which can reduce costs to the developer and municipality (Apfelbaum et al., 1996).

Agriburban developments vary widely in their approach, preserving between 40 and 95% of the site as agricultural or natural areas (McMahon, 2010; Apfelbaum et al., 1996). The net density of the built area can be comparable to or less than that of new urbanist neighbourhoods, while the gross density encompassing both built and preserved areas is close to or less than that of conventional suburbs (McMahon, 2010). Agriburbs protect sources for food production near cities (Stratton, 2009) and have potential to improve the affordability of small-scale farming operations in peri-urban areas (Newman & Nixon, 2014). Development-supported agriculture (DSA) is a cooperative finance approach that is used in some agriburban communities. A
variation of community-supported agriculture, where individuals purchase an annual share in a farmer’s crop, DSA places one-time or annual fees on homeowners within an agriburb to support farming operations. Both CSA and DSA offer the benefit of improved financial security for farmers. A key belief to the DSA concept is that agricultural land preservation can be better sustained through private agreements than government regulation. DSA is exemplified in the Harvest development in North Carolina, where property covenants require home-buyers to either farm their land or lend it to the Harvest Farm Group, who sell their produce to the local community (Wieler, 2013). An alternative approach is used at Hendrick Farm, in Quebec, where one percent of each home sale is used to subsidize the development’s central farm (Hendrick Farm, n.d.a).

While nuisance claims can occur between residents and farmers in such a setting (Kilgannon, 2007), a study of an agriburban community in Yarrow, British Columbia has found that land use conflicts can be reduced through this approach, dependent on the attitudes of residents (Newman & Nixon, 2014). In the case of the Yarrow Ecovillage, an intentional community that residents chose partly because of their shared values for nature and local food production, land adjacent to the homes has been leased to organic farmers for several years with minimal conflict (Newman & Nixon, 2014). Additionally, the development may have prevented conflict by providing a buffer between the urbanized area and the Agricultural Land Reserve in an area where conventional residential development is typically extended to within close proximity of large-scale farming operations (Newman & Nixon, 2014).

Agriburbs have received criticism, however, as they appear to fragment both residential and agricultural land uses, reducing the efficiency of both (Benfield, 2009; Lenth et al., 2006). Additionally, less land is preserved than through other preservation techniques (Brabec & Smith, 2012) and these “islands” of preservation often attract further development in surrounding areas which seek to capitalize on the amenity (Daniels, 2011). The preserved agricultural and natural lands add cost to properties and increase home values due to the desirability of these amenities, resulting in less affordable homes (Zimmerman, 2001). In this way, agriburbs propagate the tendency for natural amenities to be concentrated in affluent neighbourhoods (Zimmerman, 2001). Finally, while agriburbs appear to be a more sustainable, intensified approach to
providing country living than dispersed rural lots, they also have the potential to draw residents out of urban areas (Zimmerman, 2001). In the case of Prairie Crossing, a study by Zimmerman (2001) found that more than 60% of residents came from more dense, centrally-located neighbourhoods.

Paralleling the advent of the agriburb, Duany, Plater-Zyberk & Company (DPZ; a new urbanist planning firm) has developed an approach to town planning called “agrarian urbanism.” Scaling-up from the neighbourhood, agrarian urbanism considers how food production can be incorporated through different zones of a settlement area; from the urban-rural fringe (with tractor farms) to the urban core (with flower boxes on balconies and window sills; DPZ, 2014). Adoption of this approach, DPZ claims, would see a third of farmland developed in a community while the net productivity would triple through the integration of food production across the transect. Further, agrarian urbanism is thought to combine many of the benefits of new urbanism and agriburbs. These concepts are expanded upon in “Garden Cities: Theory & Practice of Agrarian Urbanism” by Duany (2011). This report will focus on agriculture and residential development at the urban-rural fringe which, while it represents only one portion of a settlement area, also holds relevance to the application of agrarian urbanism.

Precedents

Agriburbs have been recently introduced in Canada and include Yarrow Ecovillage near Chilliwack, BC and Hendrick Farm, which is currently under development in Chelsea, QC. At least one other, Southlands in Delta, BC, has been approved. Yarrow Ecovillage is a 25-acre site that includes 20 acres of collectively owned farmland for organic crop production and 33 private homes (Newman & Nixon, 2014). Additional housing for older adults has been tentatively planned. The ecovillage was the subject of a recent study by Newman and Nixon (2014) who examined the presence of conflicts between agricultural and residential uses. The researchers concluded that Yarrow Ecovillage allows small-scale, organic farmers access to affordable land while providing a buffer between the town and the nearby, large-scale agriculture (Newman & Nixon, 2014). The “intentional settlement” aspect of the ecovillage, which draws residents who are in agreement on core values, is identified as a key element to the apparent lack of land use conflicts (Newman & Nixon, 2014).
In the United States, these developments are far more numerous and have existed long enough to be the focus of several academic studies. Prairie Crossing, near Chicago, IL, was purchased for development in 1988 and completed in the mid-1990s. An alternative proposal had planned to accommodate 2,400 homes on the 677 acre site (Prairie Crossing, 2009). In contrast, the agriburban approach preserves 60% of the site as natural and agricultural land while developing 359 single-family homes and 36 condominiums (Prairie Crossing, 2009). Apfelbaum et al. (1996) and Apfelbaum et al. (1995) examined the stormwater management practices used at Prairie Crossing and made predictions for the benefits offered by managing stormwater on-site through the preservation of wetlands and other features. The design of Prairie Crossing was determined to offer significant improvements in the quantity and quality of stormwater runoff (Apfelbaum et al. 1995) and offer cost reductions to the developer and municipality (Apfelbaum et al. 1996). In a more theoretical analysis, Zimmerman (2013) critically analyzed the concept of nature employed in the design and marketing of Prairie Crossing. It was concluded that Prairie Crossing creates a narrow focus of the concept of nature which serves to defend desirable middle-class amenities and lifestyles (Zimmerman, 2013). Additionally, the cultural and natural heritage “preserved” at Prairie Crossing is perceived to be a biased and problematic recollection of the Midwestern colonial frontier (Zimmerman, 2013).

Another agriburban development that has been the subject of academic study is Serenbe, located near Atlanta, Georgia. Construction began at Serenbe in 2004 and the community now houses 400 residents within three hamlets, with a fourth planned for future development (Serenbe, 2015). The community design preserves 70 percent of the 900 acres lot as greenspace, including a 25 acre farm (Serenbe, 2015). The development also incorporates commercial space, in the amount of 95,000 square feet at buildout, to accommodate shops, a bakery, and two restaurants (McMahon, 2010). Master’s-level research by Gotherman (2013) examined the incorporation of agriculture into the design of the Serenbe community. It was found that the enhanced focus on food in the community contributes to a sense of place and to bringing mixed uses within walking distance (Gotherman, 2013). Unfortunately, the residential density at Serenbe appears to be insufficient to support essential amenities such as a full service grocery store (Gotherman, 2013). Gotherman (2013) also identified that the location of the farm was
considered late in the design phase and productivity was compromised as a result. While the farm also offers agricultural education opportunities for residents, this also came as a tradeoff with productivity (Gotherman, 2013). McMahon (2010) examined several “conservation communities” (a category of development that overlaps with agriburbs) and found that the design process at Serenbe began with the identification of key natural and cultural landscapes to effectively preserve rural character and history. It was also determined that such communities vary widely in their design and have gross densities comparable to or less than those of conventional suburbs (McMahon, 2010). In other studies, Stratton (2009) and Tabb (2009) both found the design of Serenbe facilitates social interaction through the use of clustering and new urbanist principles.

2.3 Development Pressure & Agriculture Viability in the Greater Golden Horseshoe

The Greater Golden Horseshoe is one of the fastest growing regions in North America (MOI, 2013). Much of the growth that is projected for the next 15 years will occur in areas adjacent to the protected countryside of the Greenbelt (see Figure 2, below). The region’s Growth Plan recognizes that careful growth management is required to preserve the benefits of such growth while addressing the drawbacks (MOI, 2013). In order to do so, the policy directions set forth in the plan include directing growth to built-up areas and limiting the urban boundary expansions, promoting transit-supportive densities and mixed land uses, and enhancing the conservation of natural systems and prime agricultural areas (MOI, 2013). As previously mentioned, Ontario contains half of Canada’s Class 1 agricultural land (Hofmann, 2001), which growth in the GGH has significantly impacted (Statistics Canada, 2014). Ontario’s growth management policies have drawn hard boundaries to control the expansion or urban areas, but have also been criticized as reducing housing affordability within those areas.

The 2015 review of the Greenbelt Plan presents an opportunity for the province to reaffirm its commitment to preserving agricultural land and limiting urban expansion. It is also an opportunity for critics to propose changes to the Plan to address the perceived shortcomings. The province of Ontario must discern how this tool can be most effectively used to facilitate sustainable development.
2.4 Implications of Agriburbs in the Greater Golden Horseshoe

Smart growth has been widely accepted by planning professionals in Canada and the United States as a preferable alternative to the development patterns that have dominated since World War II. A key aspect of the discussion around preventing sprawl is the need to preserve prime agricultural lands near settlements areas. Meanwhile, agriburbs are increasing in popularity as farms have become value-adding amenities for residential developments. A chief argument made in favour of agriburbs is their contribution to the preservation of peri-urban agricultural lands. However, due to their recent development, literature on agriburbs is limited and opinions are mixed on whether they can achieve their claims. Do agriburbs offer an efficient and effective means of preserving agricultural land? Do they facilitate the levels of transportation and infrastructure efficiency aimed for in smart growth? How agriburbs will contribute to the overall sustainable development of a region has yet to be explored.
This research will aim to address this gap in knowledge by examining agriburban, new urbanist, and conventional suburban neighbourhoods in a comparative assessment. Through a review of the provincial and regional planning policy framework for the Greater Golden Horseshoe, conclusions will be made regarding the implications of agriburban development in this context. It is hoped that this research will provide valuable insights to planners engaged in suburban planning and interested in approaches that contribute to sustainable development.
3

Research Methods
This research aims to examine agriburbs and draw conclusions regarding their sustainability. From the findings of this examination, implications are drawn for land use planning at the urban-rural fringe in the Greater Golden Horseshoe (GGH). These objectives are addressed through two parallel analyses: a qualitative comparison using secondary data from existing case studies and a review of policy relevant to the GGH planning context. This chapter describes the methods used and the limitations to this research.

3.1 Research Scope

This research is intended to inform the discourse on the conflicting demands of urban expansion and agricultural land preservation within the Greater Golden Horseshoe in southern Ontario, Canada. To this end, the following questions will be addressed:

- How do agriburbs compare with conventional and new urbanist suburbs according to sustainability assessment criteria?
- What are the implications of these findings for planning sustainable communities at the urban-rural fringe in the GGH?

Provincial and regional policies relevant to land development and preservation in the GGH were reviewed. The majority of sources from which qualitative secondary data was drawn for the case study comparison were of sites in Canada or the United States of America. In the USA, suburban development has occurred in a similar manner as in Canada and has been dominated by conventional suburbs.

3.2 Literature Review

A literature review was conducted between April, 2014 and January, 2015 to inform this research. The review examined a wide range of information that was generally produced within the last 10 years and is related to agricultural land management and suburban development. Academic books, peer-reviewed articles, government statistics, and recent Master’s- and Ph.D.-level research provided direction for the research question and sources for secondary data. Promotional websites for agriburban developments and news articles also provided context and contributed to the formation of the research question. In order to maintain the research focus as
relevant to the context of the GGH, most of the literature reviewed was from Canadian and American sources.

Through the literature review, several case studies were found of conventional, new urbanist, and agriburban neighbourhoods. A summary of these studies is presented below, in Table 1. These studies included both comparative and single-case studies. The studies examined different elements of the built form in specific neighbourhoods and the relationship of these elements with individual health, natural and agricultural land management, economic vitality, and social health and equity. Secondary data was gathered from these studies in the form of descriptive characteristics. An example of a descriptive characteristic is that, as a result of their higher gross densities, new urbanist suburbs consume less greenfield land than conventional suburbs. This data contributed to the background information in Chapter 2 of this report. Subsequently, the findings were synthesized to form qualitative descriptions of the three development approaches for the comparative assessment in Chapter 5.
Table 1: List of case studies from which information was drawn on several types of suburban development.

<table>
<thead>
<tr>
<th>Region</th>
<th>Location</th>
<th>Authors</th>
<th>Development Types</th>
<th>Topic examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>Markham</td>
<td>Gordon &amp; Vipond (2005)</td>
<td>X</td>
<td>Gross density</td>
</tr>
<tr>
<td>California</td>
<td>Various</td>
<td>Handy et al. (2008)</td>
<td>X</td>
<td>Neighbourhood form and physical activity</td>
</tr>
<tr>
<td>Colorado</td>
<td>Boulder County</td>
<td>Lenth et al. (2006)</td>
<td></td>
<td>Conservation value of clustered housing</td>
</tr>
<tr>
<td>Georgia</td>
<td>Atlanta</td>
<td>Frank et al. (2007)</td>
<td></td>
<td>Physical activity, driving, neighbourhood preferences, and the built environment</td>
</tr>
<tr>
<td>Georgia</td>
<td>Serenbe</td>
<td>Stratton (2009)</td>
<td></td>
<td>Descriptive study</td>
</tr>
<tr>
<td>Georgia</td>
<td>Serenbe</td>
<td>Tabb (2009)</td>
<td></td>
<td>Placemaking and sustainability</td>
</tr>
<tr>
<td>Georgia</td>
<td>Serenbe</td>
<td>Gotherman (2013)</td>
<td></td>
<td>Role of food in agriburban development</td>
</tr>
<tr>
<td>Georgia</td>
<td>Serenbe</td>
<td>McMahon (2010)</td>
<td></td>
<td>Descriptive study</td>
</tr>
<tr>
<td>Illinois</td>
<td>Prairie Crossing</td>
<td>Zimmerman (2013)</td>
<td></td>
<td>Use of ideas of nature in agriburban development</td>
</tr>
<tr>
<td>Illinois</td>
<td>Prairie Crossing</td>
<td>Apfelbaum et al. (1995)</td>
<td></td>
<td>Stormwater management</td>
</tr>
<tr>
<td>Maryland</td>
<td>Various</td>
<td>Southworth (1997)</td>
<td>X</td>
<td>Neighbourhood form and walkability</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Various</td>
<td>Rodriguez et al. (2007)</td>
<td>X</td>
<td>Neighbourhood form and physical activity</td>
</tr>
<tr>
<td>Ohio</td>
<td>Hypothetical</td>
<td>Morrow-Jones et al. (2010)</td>
<td>X</td>
<td>Neighbourhood form and consumer preferences</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Lower Gwynedd</td>
<td>Asabere (2012)</td>
<td></td>
<td>Open space and home value</td>
</tr>
<tr>
<td>Texas</td>
<td>Dallas</td>
<td>Talen (2001)</td>
<td>X</td>
<td>Affluent suburban residents' preferences for neighbourhood form</td>
</tr>
<tr>
<td>United States of America</td>
<td>Various</td>
<td>Talen (2010)</td>
<td>X</td>
<td>Housing affordability</td>
</tr>
<tr>
<td>Australia</td>
<td>Perth</td>
<td>Wood et al. (2008)</td>
<td></td>
<td>Neighbourhood form, social capital, and perception of safety</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Various</td>
<td>Witten et al. (2012)</td>
<td></td>
<td>Neighbourhood form and physical activity</td>
</tr>
</tbody>
</table>
3.3 Sustainability Assessment

A sustainability assessment was employed to assess agriburban development and draw conclusions regarding the implications of this approach for planning sustainable communities. The assessment used a set of eight criteria (each with one or more requirements for meeting them) for sustainability assessment developed by Robert B. Gibson. The assessment was guided by the book, *Sustainability Assessment*, by Gibson (2005) which was the first book to address sustainability assessment and has been well-received and widely cited (Morrison-Saunders, 2006). Gibson’s eight criteria are:

1. Socio-ecological system integrity;
2. Livelihood, sufficiency, and opportunity;
3. Intragenerational equity;
4. Intergenerational equity;
5. Resource maintenance and efficiency;
6. Socio-ecological civility and democratic governance;
7. Precaution and adaptation; and
8. Immediate and long-term integration.

To inform this assessment, a review was conducted of existing literature and case studies which provided secondary data on varying suburban developments. Conventional (postwar) suburbs were identified as the most prevalent approach to which new urbanist suburbs are a highly-regarded alternative amongst planning professionals. Data on conventional suburbs, new urbanist suburbs, and agriburbs were gathered to be compared according to Gibson’s assessment framework. The research that informed this report included theoretical discussions of suburban planning approaches as well as qualitative and quantitative case studies of specific neighbourhoods. This information contributed to the development of qualitative descriptions of conventional suburban, new urbanist suburban, and agriburban neighbourhoods which were evaluated in the sustainability assessment.

The eighth criteria, immediate and long-term integration, requires all of the criteria to be addressed in a coordinated manner. Addressing this assessment requires retrospection of the
results of the preceding criteria. As such, a preliminary sustainability assessment was conducted using the first seven of Gibson’s criteria and their respective requirements. To simplify this extensive assessment, each piece of descriptive data was categorized and colour-coded according to the degree to which it addressed the requirements of a specific criteria. Data were categorized as either “fully meets requirements” (green), “meets requirements to some extent” (yellow), or “does not meet requirements” (red).

The descriptions of the three suburban development approaches include a combined total of 50 characteristics. Due to the integrated nature of Gibson’s framework, which creates overlap between the criteria, some characteristics reoccurred in the consideration of multiple criteria. To allow for a more in-depth analysis, a reduced number of criteria was sought to represent the differing development approaches in a focussed comparison. After trying numerous possible combinations, it was found that three specific criteria collectively included 44 of the 50 characteristics. The three selected criteria were socio-ecological system integrity; livelihood, sufficiency, and opportunity; and resource maintenance and efficiency. Results of the assessment of each development approach according to these three criteria were examined in detail. Finally, examination of the criteria of immediate and long-term integration offered a comprehensive perspective of the results of each approach in Gibson’s assessment framework.

3.4 Policy Review

The Provincial Policy Statement (MAH, 2014a), the Greenbelt Plan (MAH, 2005), and the Growth Plan for the Greater Golden Horseshoe (MOI, 2013) were reviewed to understand the potential for agriburban development to contribute to regional objectives for sustainable communities. This review drew mainly from the policy documents themselves with complementary information drawn from provincial ministry websites, academic literature, and news media.

The analysis of policy content was inductive and focussed on the concepts and themes associated with the content, rather than keywords. Each document was reviewed in its entirety, and mentions of relevant concepts and themes were recorded. Policy statements relating to growth management; growth boundaries; urban, rural, and agricultural land uses; and sustainable
communities were noted. Following this, related policy sections were summarized as briefly as possible without compromising the meaning. The summaries were arranged in a table for each policy document. These tables are included in Appendix B. Chapter 4 provides a synthesis of and comments on these findings. The policy review enabled this research to draw conclusions from the sustainability assessment with regard to the implications of agriburbs in the planning policy context of the GGH.

3.5 Research Limitations

A primary limitation of this research is the use of selective secondary data for informing the sustainability assessment. Greater validity could be achieved through primary research, beginning with a detailed examination of Gibson’s criteria and subsequently forming a case study framework to address the criteria. Instead, this research drew selectively from a broad range of available secondary data that was gathered with alternate comparison criteria in mind. This limitation to the research is mitigated through the selection of secondary data that is from similar planning contexts to the GGH and is recently published.

Additionally, this research was limited by the subjective nature of some criteria of the sustainability assessment. This is demonstrated in the criterion of Livelihood, Sufficiency, and Opportunity which requires that “everyone and every community has enough for a decent life” (Gibson, 2005). Regarding suburban development, the degree of social interaction versus privacy, or public amenities versus private property, that constitutes a “decent life” is subject to personal beliefs. Though many of the sources of secondary data used for the assessment were quantitative studies that used objective measurements, this assessment required the researcher to rate these measurements against subjective criteria. To address this limitation, the researcher drew on personal knowledge of public and professional opinion in categorizing data according to how well it met the criteria for sustainability. In cases where opinions seemed equally divided on a specific topic, it was often categorized as “meets requirements to some extent” to reflect this mix of opinions. Despite the intentions of the researcher to produce valid and objective findings, it would be naïve to assume Gibson’s criteria could be applied in any assessment completely free of subjectivity.
This research aims to draw lessons for planning in the Greater Golden Horseshoe from previously-observed results of different approaches within and outside this context. A final limitation of this research is that it did not incorporate perspectives of professional planners who are currently practicing in this context. The opinions of academic experts were drawn on through the literature review and consideration of GGH policies allowed recommendations for this context to be formed from the research findings. However, interviews with regional planners and greenfield developers could shed further light on the recent progress made and challenges that lie ahead in this field. These limitations and the potential for further research are discussed further in Chapter 6.
4
Sustainability Assessment
The Provincial Policy Statement asserts that “Efficient land use and development patterns support sustainability” (MAH, 2014a). This chapter presents an evaluation of agriburbs in comparison with conventional suburbs and new urbanist suburbs in order to identify implications for planning sustainable communities. This comparative assessment uses secondary data in the form of descriptive characteristics of the development approaches from sources that were presented in Chapter 2. In this chapter, the characteristics are synthesized into descriptions of the three suburban development approaches which are then compared according to the sustainability assessment criteria of Gibson (2005).

4.1 Descriptions of Suburban Development Approaches

To inform this assessment, a review was conducted of existing literature and secondary data was drawn from peer-reviewed articles and books on varying suburban developments. Conventional (postwar) suburbs were identified as the most prevalent approach to which new urbanist suburbs are a highly-regarded alternative amongst planning professionals. Data on conventional suburbs, new urbanist suburbs, and agriburbs were gathered to be compared according to Gibson’s assessment framework. The research that informed this comparison included theoretical discussions of suburban planning approaches as well as qualitative and quantitative case studies of specific neighbourhoods. This information contributed to the development of qualitative descriptions of conventional suburban, new urbanist suburban, and agriburban neighbourhoods which were evaluated in the sustainability assessment. The following subsections present the descriptions of each of the three development approaches. The characteristics that make up these descriptions are organized according to broad themes to simplify their presentation.

4.1.1 The Conventional Suburb

A detailed explanation of conventional suburbs and their contribution to urban sprawl at the regional level was provided in the background of this report (Chapter 2). Key characteristics of conventional suburbs considered for the purposes of this assessment are listed below.
**Social Aspects**

1. Desired by majority of homebuyers (Morrow-Jones et al., 2010; Talen, 2001)
2. Decreased sense of place (Frumkin et al., 2004, 21)
3. Decreased utilitarian physical activity (Handy et al., 2008; Frank et al., 2007; Frumkin et al., 2004, 8)
4. Increased leisure activity (Rodriguez et al., 2007)
5. Increased privacy and social isolation (Frumkin et al., 2004, 159; Freilich, 1999, 22)
6. Decreased political participation, donating, and volunteering (Freilich, 1999, 22)
7. Increased anxiety and depression (Frumkin et al., 2004, 159-160)

**Housing**

1. Increased private property (Gordon & Vipond, 2005; Freilich, 1999)
2. Homogeneous housing stock (Freilich, 1999, 16)

**Infrastructure and Natural Resources**

1. Relatively low gross density (Gordon & Vipond, 2005)
2. Increased destruction of the natural environment (Gordon & Vipond, 2005)
3. Increased consumption of fossil fuels (Freilich, 1999, 16)
4. Increased quantity and contamination of stormwater runoff (Frumkin et al., 2004, 131)
5. Contribution to municipal challenges in the forms of traffic congestion, infrastructure deficiency, and urban deterioration (Freilich, 1999, 16)
6. Irreversible conversion of agricultural land (Gordon & Vipond, 2005; Freilich, 1999, 16)
7. Increased automobile dependency (Handy et al., 2008; Frank et al., 2007; Frumkin et al., 2004, 8)

4.1.2 The New Urbanist Suburb

The origins of new urbanist design principles have also been outlined in the background of this report. Key characteristics of new urbanist suburbs considered for the purposes of this assessment are listed below.
Social Aspects

1. Increased ability to use alternative modes of transportation (Handy et al., 2008; Frank et al., 2007; CNU, 2001)
2. Increased independence for those who cannot or choose not to drive (such as children and the elderly; CNU, 2001; Duany & Plater-Zyberk, 1994)

Housing

1. Return to community focus and previous housing forms such as townhouses, secondary suites, and high-quality apartments (Katz, 1994)
2. Increased variety in housing stocks intended to increase social diversity and housing affordability (CNU, 2001; Duany & Plater-Zyberk, 1994)
3. Actualized examples can lack sufficient variety in housing stock to be affordable to median-income households (Talen, 2010; Southworth, 1997)
4. Affordability is worsened by high demand and limited supply (Stratton, 2009; Zimmerman, 2001)
5. Decreased average dwelling size and property setbacks (Gordon & Vipond, 2005; Duany & Plater-Zyberk, 1994)

Infrastructure and Natural Resources

1. Inclusion of civic, institutional, and commercial activity in neighbourhoods (Grant, 2007; CNU, 2001; Duany & Plater-Zyberk, 1994)
2. Increased density around transit stops to support transit service (CNU, 2001; Duany & Plater-Zyberk, 1994)
3. Increased public space, providing opportunities for recreation, community life, and contact with nature (Zimmerman, 2001)
4. Decreased conversion of greenfield land through increased gross density (Gordon & Vipond, 2005)

4.1.3 The Agriburb

Agriburban developments have been described in works of theory and history (Sandul, 2010; McMahon, 2010; Stratton, 2009) as well as evaluation (Newman, 2014; Gotherman, 2013; Tabb, 2009; Zimmerman, 2001; Apfelbaum et al., 1996). Key characteristics of agriburban neighbourhoods considered for the purposes of this assessment are listed below.
Social Aspects

1. Improved affordability of peri-urban farming in areas with prohibitive land costs (Newman, 2014)
2. While nuisance claims can occur (Kilgannon, 2007), conflicts between residential and agricultural uses are reduced by creating a buffer of small-scale agriculture and residents seeking agricultural environment, especially in intentional communities (Newman, 2014)
3. Nature and agriculture amenities provide outdoor recreation opportunities (Apfelbaum et al., 1996)
4. Can provide agriculture education opportunities (Apfelbaum et al., 1996) but as a tradeoff for farm productivity (Gotherman, 2013)
5. Farming operations can be considered late in the design process which negatively impacts productivity (Gotherman, 2013)
6. Increased sense of place and community (Gotherman, 2013; Tabb, 2009)
7. More possibility for social interaction due to clustering and new urbanist design principles (Stratton 2009; Tabb, 2009)
8. Preserves rural character and history (McMahon, 2010) but, arguably, a biased history that propagates false norms (Zimmerman, 2013)

Housing

1. Amenities add value and real cost to dwellings, decreasing housing affordability and propagating tendency for natural amenities to be concentrated in affluent neighbourhoods (Zimmerman, 2001)
2. Residential proximity to agricultural land can improve consumer desirability and outweigh drawbacks associated with higher density (Morrow-Jones et al., 2010)

Infrastructure and Natural Resources

1. Preserves significant portion of development (40-95%) as agricultural or natural areas (McMahon, 2010; Apfelbaum et al., 1996)
2. Net densities of built areas can range widely from that of traditional neighbourhoods to estate lots (McMahon, 2010)
3. Gross densities (including conservation areas) can be comparable to conventional suburbs or less dense (McMahon, 2010)
4. Preserves agricultural land and food production close to urban areas (Stratton, 2009)
5. Design can begin with identifying key natural and cultural landscape features (McMahon, 2010; Apfelbaum et al., 1996)
6. Aims to reduce negative impacts of development by encouraging biodiversity and preserving habitat (Zimmerman, 2001; Apfelbaum et al., 1996)
7. Tends to fragment natural areas which results in low habitat conservation value (Lenth et al., 2006)
8. “Islands” of preserved land can attract more development of adjacent greenfield lands (Daniels, 2011)
9. Reduces volume and contamination of stormwater runoff through preserving natural areas, reducing developer and municipality costs (Apfelbaum et al., 1996, Apfelbaum et al., 1995)
10. Can draw residents from central city and older suburbs to less dense, more automobile-oriented neighbourhood (Zimmerman, 2001)
11. Incorporates mixed uses such as commercial and employment within walking distance, but residential density may not support essential features like a full-service grocery store (Gotherman, 2013)

4.2 Approaches to Assessing Sustainability

Sustainability is commonly conceptualized as being comprised of three pillars: the environment, society, and the economy (Gibson, 2005, 55). This framework has been popularized due to its convenient fit with traditional fields in governance and academia (Gibson, 2005, 56). While conceived as connected and interdependent, the three pillars of sustainability are rarely addressed in a well-integrated manner. Instead, because of the convenient fit with existing fields of knowledge, sustainability is sought through coordinated but distinct efforts in each of those fields (Gibson, 2005, 56). This pattern is reflected in approaches to sustainability in planning. Smart growth has been described as a means of creating sustainable communities (Freilich, 1999, 30). However, it has been suggested that much of the literature on smart growth has failed to address sustainable development in an integrated manner, but tends instead to look at planning for growth and planning for conservation as two separate fields (Daniels & Lapping, 2011).
Gibson (2005) responds to this lack of integration by presenting new criteria for assessing sustainability. While one of many approaches to assessing sustainability, the criteria proposed by Gibson offer a more integrated and comprehensive assessment than the pillar approach (2005, 115). The eight criteria proposed by Gibson (2005, 116-118) are:

1. **“Socio-ecological system integrity”** – Build human-ecological relations to establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological well-being depends.

2. **Livelihood sufficiency and opportunity** – Ensure that everyone and every community has enough for a decent life and that everyone has opportunities to seek improvements in ways that do not compromise future generations’ possibilities for sufficiency and opportunity.

3. **Intragenerational equity** – Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.

4. **Intergenerational equity** – Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.

5. **Resource maintenance and efficiency** – Provides a larger base for ensuring sustainable livelihoods for all while reducing threats to the long-term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.

6. **Socio-ecological civility and democratic governance** – Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision making bodies to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary and personal decision making practices.

7. **Precaution and adaptation** – Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise and manage for adaptation.

8. **Immediate and long-term integration** – Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”
4.3 Selected Assessment Framework

The eighth criteria, immediate and long-term integration, requires all of the criteria to be addressed in a coordinated manner. Assessing this criteria requires retrospection of the results of the preceding criteria. As such, a preliminary assessment was conducted using the other seven of Gibson’s criteria. To simplify the extensive amount of information, each piece of descriptive data was categorized and scored according to the degree to which it addressed the requirements of a specific criteria. Data were categorized as either “fully meets requirements” (score of two), “meets requirements to some extent” (score of one), or “does not meet requirements” (score of zero). Following this, an average score for each development according to each criteria was calculated. Table 2, below, presents the average score for the seven criteria as well as the overall average for each development approach. A detailed summary of the complete assessment is included in Appendix A.

The descriptions of the three suburban development approaches include a combined total of 50 characteristics. Due to the integrated nature of Gibson’s framework, which creates overlap between the criteria, some characteristics reoccurred in the consideration of multiple criteria. To allow for a more in-depth analysis, a reduced number of criteria was sought to represent the differing development approaches in a focussed comparison. After trying numerous possible combinations, it was found that three specific criteria collectively included the greatest portion of characteristic, which was 44 of the 50 characteristics. The three selected criteria were socio-ecological system integrity; livelihood, sufficiency, and opportunity; and resource maintenance and efficiency. Table 3 presents a description of each of the development approaches as they relate to these three criteria of focus. To assist in the interpretation of this information, the characteristics are colour-coded as green, yellow, or red to indicate that they meet criteria requirements fully, to some extent, or not at all.
Table 2: Average scores of the categorized development characteristics in relation to sustainability criteria (2 = fully meets criteria requirements, 0 = does not meet criteria requirements).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-ecological system integrity</td>
<td>0.00</td>
<td>1.67</td>
<td>1.13</td>
</tr>
<tr>
<td>Livelihood, sufficiency, and opportunity</td>
<td>0.60</td>
<td>1.56</td>
<td>1.40</td>
</tr>
<tr>
<td>Intrigenerational equity</td>
<td>0.38</td>
<td>1.71</td>
<td>1.50</td>
</tr>
<tr>
<td>Intergenerational equity</td>
<td>0.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Resource maintenance and efficiency</td>
<td>0.00</td>
<td>2.00</td>
<td>1.20</td>
</tr>
<tr>
<td>Socio-ecological civility and democratic governance</td>
<td>0.00</td>
<td>2.00</td>
<td>1.80</td>
</tr>
<tr>
<td>Precaution and adaptation</td>
<td>0.00</td>
<td>1.67</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Average of first seven criteria</strong></td>
<td><strong>0.14</strong></td>
<td><strong>1.80</strong></td>
<td><strong>1.29</strong></td>
</tr>
</tbody>
</table>
Table 3: Comparison of select criteria for assessing sustainability with three approaches to suburban planning (rating categories indicated by colour).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-Ecological System Integrity</td>
<td>Increased destruction of the natural environment</td>
<td>Increased ability to use alternative modes of transportation</td>
<td>Preserves significant portion of land as agricultural or natural</td>
</tr>
<tr>
<td></td>
<td>Increased consumption of fossil fuels</td>
<td>Decreased dwelling size and setbacks</td>
<td>Can begin with identifying key natural and cultural landscape features</td>
</tr>
<tr>
<td></td>
<td>Increased quantity and contamination of stormwater runoff</td>
<td>Decreased conversion of greenfield land through increased gross density</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Irreversible conversion of agricultural land</td>
<td></td>
<td>Reduces contaminated stormwater runoff</td>
</tr>
<tr>
<td>Criteria Score</td>
<td>0.00</td>
<td>1.67</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Legend

- Fully meets criteria requirements
- Meets criteria requirements to some extent
- Does not meet criteria requirements
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desirable living environment</td>
<td>Inclusion of civic, institutional, and commercial activity</td>
<td>Preserves agricultural land and food production close to urban areas</td>
</tr>
<tr>
<td></td>
<td>Increased leisure physical activity</td>
<td>Increased independence for those who cannot or choose not to drive</td>
<td>Improves affordability of peri-urban farming in areas with prohibitive land costs</td>
</tr>
<tr>
<td></td>
<td>Increased private property</td>
<td>Increased variety in housing stock</td>
<td>Generally reduces conflicts between residential and agricultural uses by creating buffer zone of small-scale agriculture and residents seeking agricultural setting</td>
</tr>
<tr>
<td></td>
<td>Increased privacy and social isolation</td>
<td>Increased sense of place</td>
<td>Nature and agriculture amenities provide outdoor recreation opportunities</td>
</tr>
<tr>
<td></td>
<td>Decreased sense of place</td>
<td>Increased public space</td>
<td>Can provide agriculture education opportunities</td>
</tr>
<tr>
<td></td>
<td>Increased automobile-dependency</td>
<td>Increased possibility for social interaction</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Decreased utilitarian physical activity</td>
<td>Decreased average dwelling size and property setbacks</td>
<td>Reduces contaminated stormwater runoff, reduces infrastructure costs</td>
</tr>
<tr>
<td></td>
<td>Homogeneous housing stock</td>
<td>Decreased private space</td>
<td>Increased possibility for social interaction</td>
</tr>
<tr>
<td></td>
<td>Decreased political participation, donating, and volunteering</td>
<td>Generally poor housing affordability</td>
<td>Increased sense of place and community</td>
</tr>
<tr>
<td></td>
<td>Increased anxiety and depression</td>
<td></td>
<td>Net densities of built areas can range widely from that of traditional neighbourhoods to estate lots</td>
</tr>
<tr>
<td>Livelihood, Sufficiency &amp; Opportunity</td>
<td></td>
<td></td>
<td>Farming productivity can be negatively impacted, particularly if considered late in design process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Incorporates mixed uses such as commercial and employment within walking distance, but residential density may not support essential features like a full-service grocery store</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decreased housing affordability and concentrates natural amenities in affluent neighbourhoods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Natural areas are fragmented, results in low habitat conservation value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Draws residents from central city and older suburbs to less dense, more automobile-oriented neighbourhood</td>
</tr>
</tbody>
</table>

<p>| Criteria Score | 0.60 | 1.56 | 1.40 |</p>
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Maintenance &amp; Efficiency</td>
<td>Increased private property</td>
<td>Increased variety in housing stocks intended to increase social diversity and housing affordability</td>
<td>Preserves significant portion (40-95%) as agricultural or natural</td>
</tr>
<tr>
<td></td>
<td>Increased destruction of the natural environment</td>
<td>Increased density around transit stops to support transit service</td>
<td>Preserves agricultural land and food production close to urban areas</td>
</tr>
<tr>
<td></td>
<td>Increased consumption of fossil fuels</td>
<td>Increased ability to use alternative modes of transportation</td>
<td>Improves affordability of peri-urban farming in areas with prohibitive land costs</td>
</tr>
<tr>
<td></td>
<td>Inefficient use of existing infrastructure</td>
<td>Decreased average dwelling size and property setbacks</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Irreversible conversion of agricultural land</td>
<td>Decreased private space, increased public space</td>
<td>Reduces contaminated stormwater runoff, reduces infrastructure costs</td>
</tr>
<tr>
<td></td>
<td>Increased quantity and contamination of stormwater runoff</td>
<td>Decreased conversion of greenfield land through increased gross density</td>
<td>Net densities of built areas can range widely from that of traditional neighbourhoods to estate lots</td>
</tr>
</tbody>
</table>

- Design can begin with identifying key natural and cultural landscape features – if considered late, farming productivity is negatively impacted
- Gross densities comparable to conventional suburbs or less dense
- Natural areas are fragmented, results in low habitat conservation value
- Draws residents from central city and older suburbs to less dense, more automobile-oriented neighbourhood

| Criteria Score | 0.00 | 2.00 | 1.20 |
4.4 Discussion of Assessment Findings

The visual representation of the sustainability assessment, presented in Table 1, provides an overview of the development approaches that were examined and the degree to which their characteristics meet the criteria requirements. It is evident that conventional suburbs fail to meet many of Gibson’s requirements for sustainability. New urbanist suburbs, on the contrary, fully meet many of the requirements and only fail on the basis of two characteristics. It is noteworthy that new urbanist suburbs fail to meet requirements of the two criteria for which conventional suburbs are able to meet requirements (those being intragenerational equity and livelihood, sufficiency, and opportunity). Against all criteria, the agriburban approach meets requirements for sustainability in some aspects but fails, in part or completely, to meet the requirements in other aspects. This suggests that the existing examples of the approach do not fully contribute to planning sustainable communities. However, it may be possible to improve upon past instances of agriburban development and address their weaknesses by incorporating aspects of other approaches. The following subsections will examine the assessment results of the three criteria of focus before synthesizing these in a comprehensive review.

4.4.1 Socio-Ecological System Integrity

The criterion of socio-ecological system integrity requires an improved understanding of the systemic implications of human activities and the reduction of threats to system integrity and life support viability. The assessment found that conventional suburban development fails to meet these requirements due to its low density and lack of consideration of the ecological services or agricultural uses that are permanently replaced. The higher density of the new urbanist suburb offers considerable improvements by facilitating the use of active transportation and public transit, and requiring the conversion of less greenfield land.

In theory, agriburbs offer improvement to other suburbs by considering natural and cultural landscape features early in the design process and preserving these to add function and value to the community. In actuality, the balance of conservation and development is problematic. The gross density of an agriburban development tends to be equal or less dense than conventional suburbs (meaning as much or more area is impacted) while the preserved areas
offer little conservation value and have reduced agricultural productivity. In addition, rural character and cultural heritage may be preserved, but this can occur in a manner that propagates biased histories. Preservation efforts in agriburb design have, however, successfully reduced contaminant loads and volumes of stormwater runoff in agriburban development. This results in lower infrastructure costs and mitigates one aspect of a development’s environmental impact. Overall, while the aspirations of agriburbs are positive, their tendency to negatively impact a broader area than other development approaches is contradictory to the criteria of socio-ecological system integrity.

4.4.2 Livelihood, Sufficiency, and Opportunity

Livelihood, sufficiency, and opportunity requires the provision for everyone and every community to have a decent life and the opportunity to seek improvements to their life while not comprising the ability of future generations to do likewise. All three development approaches meet the requirements of this criterion in some regards but fail to meet them in others. The conventional suburban approach produces neighbourhoods that are desirable to a majority of North American homeowners due to the low density, increased privacy, and isolation from urban centres. However, the homogenous nature of the housing stock provides housing options for a narrow range of society. Additionally, despite their popularity, such neighbourhoods have been shown to be detrimental to their inhabitants through enforcing automobile-dependency, having a lack of sense of place, and causing social isolation which leads to anxiety, depression, and decreased political participation. By incorporating a range of housing forms at generally higher densities, and providing more public space and amenities in return, new urbanist neighbourhoods offer improvements over conventional suburbs. Residents and visitors alike have more freedom to choose alternate modes of transportation, more opportunity for social interaction, and a greater sense of place. However, the obvious tradeoff is a reduction in private space, which many view as a disadvantage that outweighs these benefits. Additionally, while new urbanist theory promotes a range of housing forms to increase housing affordability and social mix, actual examples often do not have a sufficient supply of affordable options to achieve these goals. Housing affordability is worsened by a limited supply of new urbanist neighbourhoods in many regions, which fails to meet the demand that exists.
Proponents of agriburbs claim that these developments can provide the best of both alternatives for residents by combining new urbanist design principles with the preservation of natural and agricultural lands. This claim is supported by evidence that proximity to natural and agricultural landscapes is a value-adding amenity that can outweigh the perceived drawbacks of higher densities. In addition to these amenities, agriburbs offer a design that fosters a unique sense of place and enhanced community life. By preserving agricultural land, agriburbs facilitate food production near urban areas, increase the affordability of small-scale farming, and can provide a buffer between conventional suburbs and large-scale agricultural operations. However, similar to new urbanist neighbourhoods, actual examples of agriburbs do not achieve all of their proclaimed benefits. While the natural and agricultural landscapes provide opportunities for outdoor recreation and agriculture education, the presence of visitors and nearby residents can reduce farming productivity. Agriburbs also tend to combine the homogenous housing stock of conventional neighbourhoods with the high demand of new urbanist ones resulting in poor housing affordability. As a consequence of this, such developments propagate the tendency for high quality public amenities to be concentrated in affluent neighbourhoods. The results of the comparison suggest that agriburban development partially meets the requirements of the criteria of livelihood, sufficiency, and opportunity.

4.4.3 Resource Maintenance and Efficiency

The criterion of resource maintenance and efficiency requires the reduction of extractive damage, avoidance of waste, and cutting material and energy use per unit of benefit. In this way, the criterion seeks to ensure sustainable livelihoods are provided for every person while threats to socio-ecological systems are reduced. The new urbanist approach offers a clearly preferable alternative to conventional suburbs when considering this criteria. As a result of the decreased property and dwelling sizes, new urbanist neighbourhoods consume less greenfield land, make better use of new infrastructure, and promote efficient transportation systems over automobile-dependency.

While agriburbs seek to balance development and conservation, their overall impact is difficult to gauge and may be worse than conventional suburbs. As a result of the conservation areas they encompass, the gross density of agriburbs tend to be comparable or less than that of
conventional suburbs. However, the natural areas that are conserved are fragmented and have little conservation value. Despite conservation efforts, such developments appear to conserve less than would occur if the same site were only partly developed with a conventional suburb. Precisely how efficiently agriburban development can provide for housing and agricultural operations requires further research in a quantitative form. Nonetheless, this assessment suggests that neither land use is provided in as efficient a manner as if they could be if kept separated. The benefits of affordable, peri-urban farmland to facilitate small-scale, local food production appear outweighed by this overall inefficiency.

4.4.4 Immediate and Long-Term Integration: A Comprehensive Perspective

Gibson’s framework places an emphasis on integrated approaches to sustainability. The eighth criteria, immediate and long-term integration, requires positive steps in all aspects of sustainability and prohibits convenient compromises. As a result of this focus on integration, this criteria was addressed through reflection on the results of the preceding seven. This secondary analysis synthesized the development characteristics that were compared throughout the assessment. In this way, the findings of the comparison using this criteria offer a comprehensive perspective of the sustainability assessment as a whole. These findings are presented below, in Table 4.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate and long-term integration</td>
<td>Desirable living environment</td>
<td>Most efficient use of land, energy, and resources</td>
<td>Preservation of peri-urban farmland and other natural amenities</td>
</tr>
<tr>
<td></td>
<td>Decreased land, energy, and resource efficiency</td>
<td>Density is less desirable, but offers benefits to residents</td>
<td>Conservation and development can be contradictory and counter-productive</td>
</tr>
<tr>
<td></td>
<td>Detrimental health and social impacts</td>
<td>Limited affordable housing options</td>
<td>High demand and homogenous housing stock</td>
</tr>
<tr>
<td></td>
<td>Homogenous housing stock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 4: Comparison of the integration criterion with the three development approaches.*
An undesirable aspect of each of the approaches examined is the insufficient provision of affordable housing options. This indicates that the provision of a range and mix of housing options in suburban development is a challenge that remains largely unaddressed. However, new urbanist suburbs offer many improvements in efficiency over conventional suburbs and, while less popular, also offer health and social benefits to their residents. The preservation of peri-urban farmland and other natural amenities are positive characteristics of agriburbs. However, these may be outweighed by the low density and lack of efficiency of residential, agricultural, and natural conservation uses.

The findings of this assessment offer implications for how agriburban development can contribute to planning sustainable communities. Chapter 5 will examine the themes of peri-urban community development in the regional planning documents for the Greater Golden Horseshoe. Implications of the assessment findings and recommendations for this planning context will be discussed in Chapter 6.
5
Policy Review
In order to examine the implications of agriburban development for land use planning in the Greater Golden Horseshoe, the relevant provincial and regional policies were examined. This chapter presents the results of the descriptive review that was conducted of the Provincial Policy Statement, the Growth Plan for the Greater Golden Horseshoe, and the Greenbelt Plan.

The analysis of policy content was inductive and focussed on the concepts and themes associated with the content, rather than keywords. Each document was reviewed in its entirety, and mentions of relevant concepts and themes were recorded. Policy statements relating to growth management; growth boundaries; urban, rural, and agricultural land uses; and sustainable communities were noted. The range of related policy sections were paraphrased and arranged in tables in Appendix B. This chapter provides a synthesis of and comments on these findings. It should be noted that while this research explores the balance between conservation and development, it places focus on conservation of agricultural lands and uses. While each of the policies reviewed also addresses conservation of natural heritage, biodiversity, and ecosystem services; such statements were only included in the findings when they related to suburban development or agriculture.

5.1 Provincial Policy Statement

5.1.1 Purpose

The Ministry of Municipal Affairs and Housing describes the Provincial Policy Statement as a statement of the Ontario government’s policies on land use planning (MAH, 2014b). The statement was issued under the Planning Act in 1996 and subsequently updated in 2005 and 2014 (MAH, 2014b). In its opening preamble, the PPS (MAH, 2014a) states that its aim is to provide “for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment.”

5.1.2 Relevant Content

Efficient development and sustainable communities are recurring themes throughout the PPS. In the Vision for Ontario’s Land Use Planning System, the PPS describes how “Land use must be carefully managed to accommodate appropriate development to meet the full range of current and future needs, while achieving efficient development patterns and avoiding significant
or sensitive resources.” Particularly relevant to suburban development are the frequent mentions of the necessity of a mix and range of housing; densities and mix of land uses to support transit and active transportation; the focus of (re)development in built-up and designated growth areas; and the conservation of agricultural land, natural resources, and heritage landscapes. The PPS sections relevant to this research are summarized in section 1 of Appendix B.

5.2 Greenbelt Plan

5.2.1 Purpose

The Greenbelt Plan is a regional policy document issued by the MAH in 2005, under the Greenbelt Act, in response to strong growth pressure in the Greater Golden Horseshoe. The Greenbelt Plan area, shown in Figure 3, includes lands within the Niagara Escarpment and the Oak Ridges Moraine and expands upon these with the newly designated Protected Countryside areas. The goals of the plan are to guide agricultural protection; environmental protection; culture, recreation, and tourism; settlement areas; and infrastructure and natural resources in the GGH (MAH, 2005).

5.2.2 Relevant Content

The policies of the Greenbelt Plan relate to urban-rural fringe development and agricultural land preservation in several aspects. The Greenbelt Plan provides protection of the regional agricultural system through restricting land use changes, maintaining separation between agricultural and non-agricultural uses, and encouraging a comprehensive conception of the broader agricultural system of southern Ontario. The Plan also supports the development of publicly accessible, natural open spaces to provide recreation opportunities and to support natural heritage connectivity. The Greenbelt Plan uses specific conditions to restrict the expansion of settlement areas within the plan area in order to maintain the Protected Countryside. Generally, uses other than agriculture or agriculture-related activities are prohibited in the Protected Countryside. The 10-year Plan review period (occurring in 2015) provides an opportunity for modest settlement area expansions to be proposed. Relevant sections of the Greenbelt Plan are summarized in section 2 of Appendix B.
5.3 Growth Plan for the Greater Golden Horseshoe

5.3.1 Purpose

The Growth Plan for the Greater Golden Horseshoe was issued in 2006 by the Ontario Ministry of Infrastructure (MOI) under the Places to Grow Act. The Growth Plan aims to provide growth management policy direction by guiding decisions on transportation, infrastructure, land use, urban form, housing, natural heritage and resource protection (MOI, 2013). The Growth Plan is a regional policy document for the Greater Golden Horseshoe in southern Ontario. The plan area is shown below, in Figure 4.

A common criticism of previous conservation plans in the GGH and other jurisdictions is that such boundaries, despite their aim to limit sprawl, cause urban expansion to leapfrog beyond the conservation areas in an even less dense manner (Fung & Conway, 2007). The Growth Plan
offers a significant improvement to other greenbelt initiatives by complementing the Greenbelt Plan and guiding growth within and surrounding the Greenbelt area (Fung & Conway, 2007).

Figure 4: Conceptual map of the Greater Golden Horseshoe and its components - the Greenbelt, built-up areas, and designated greenfield areas.

5.3.2 Relevant Content

The Growth Plan for the GGH establishes targets for residential and employment densities for development in built-up and designated greenfield areas. The Plan also establishes that, by 2015, 40% of all residential development should occur within built-up areas. Urban-rural fringe development in designated greenfield areas is required by the Plan to accommodate at least 50 residents and jobs combined per hectare. Additionally, the Plan describes the manner in
which growth should occur; specifying that both greenfield and infill development should provide a mix of land uses, support active transportation and transit, and contribute to complete communities (i.e. communities that accommodate people at all stages of life and facilitate easy access to meet one’s daily needs).

A balance between growth and conservation is sought in the Growth Plan for the GGH. The Plan reinforces the goals of the Greenbelt Plan by protecting agricultural lands and uses and supporting the conservation of water, energy, and cultural heritage. The Plan also directs development to occur in a way that uses existing and planned infrastructure efficiently and effectively to avoid unsustainable and unnecessary expansion of the infrastructure system.

5.4 Planning in the Greater Golden Horseshoe

The Greenbelt Plan and the Growth Plan for the Greater Golden Horseshoe have shaped growth management and conservation within the GGH region since their introduction in 2005. These plans support the directive of the PPS that “Ontario’s long-term prosperity, environmental health and social well-being depend on wisely managing change and promoting efficient land use and development patterns” (MAH, 2014a). The contribution that agriburbs, conventional suburbs, and new urbanist suburbs can make toward this directive are explored in the following chapter.
6

Implications for Planning in the Greater Golden Horseshoe
This report has presented a sustainability assessment of conventional suburbs, new urbanist suburbs, and agriburbs and has reviewed relevant provincial and regional policies for suburban land use planning in the Greater Golden Horseshoe. Examining the results of these two research methods, implications can be drawn for planning sustainable communities at the urban-rural fringe in the Greater Golden Horseshoe. This chapter will summarize the key findings of this research and the implications of these findings for this planning context. Following this, opportunities for further research will be discussed.

6.1 Key Findings

6.1.1 Housing Affordability

The results of the sustainability assessment indicated that all three approaches to suburban development were not effective at providing a broad range of housing options. This finding implies that further improvement is required for the provision of a diverse and affordable housing stock in suburban residential developments. The Provincial Policy Statement makes numerous references to the importance of providing a range and mix of housing for building strong, healthy communities. The Growth Plan similarly aims to build complete communities which accommodate people from all stages of life. In theory, the new urbanist approach incorporates the greatest range of housing options. Unfortunately, in practice, even this approach falls short of accommodating the full range of income levels that is represented in the populations of Canada and the United States (Talen, 2001).

The findings of this research indicate that existing agriburban development has not directly contributed to the provision of affordable housing. On the contrary, agriburbs have combined the narrow range of housing options of conventional suburbs with the limited supply and high demand of new urbanist ones. The unfortunate result is that the high quality public amenities provided within agriburban neighbourhoods are only easily accessed by a select portion of society that can afford to live there.

6.1.2 Density and Desirability

A recurring theme throughout this evaluation of suburban development approaches is the trade-off that exists between density and desirability. Conventional suburbs have been both
highly demanded and widely criticized for their low density and the increased private amenities this affords. New urbanist suburbs have been generally well-received by practicing planners because they use land, resources, and infrastructure more efficiently; facilitate alternatives to automobile-dependency; and increase opportunity for social interaction. As a result of these characteristics, the sustainability assessment indicated that the new urbanist suburb best meets the requirements of the resource maintenance and efficiency criteria. Additionally, these characteristics of new urbanist suburbs are consistent with the standards of healthy and sustainable communities described in the PPS.

Unfortunately, to the majority of the general public, the benefits of higher density development do not outweigh the perceived drawbacks. When the decreased desirability of higher density was also considered for the criteria of livelihood, sufficiency, and opportunity; conventional and new urbanist suburbs scored more closely. However, despite being less desired, the benefits that new urbanist suburbs offer their residents resulted in these neighbourhoods still scoring highest for this criteria. Previous research indicates that homebuyer preferences can be contradictory; such as desiring a less connected street network, lower density housing, and proximity to farmland while maintaining shorter commute times (Morrow-Jones et al., 2010). This suggests that education is required to address these conflicting desires (Morrow-Jones et al., 2010; Talen, 2001). Hopefully, a better-informed public will increase demand for higher-density, more sustainable suburbs.

Small-scale, organic farms have been found to be value-adding amenities for new residential developments. Agriburban developments have capitalized on this knowledge to produce highly-demanded suburbs. The inclusion of these amenities gave agriburbs a score close to new urbanist suburbs when considering livelihood, sufficiency, and opportunity. However, the low gross density of existing agriburbs results in a much lower score for resource maintenance and efficiency compared to new urbanist suburbs. The desirability of new urbanist suburbs might be increased through incorporating higher quality amenities, similar to agriburbs. The obvious challenge is whether this can be done without compromising efficiency as in the cases of agriburbs that were examined in this report. The Growth Plan and the PPS support integration like this through requiring the provision of quality public open spaces while also meeting targets
for residential and employment densities and facilitating transportation and infrastructure efficiency.

6.1.3 Integrating Conservation and Development

Can low density development occur in a way that benefits the environment? Proponents have suggested this can be achieved with agriburbs. The website for Prairie Crossing, an agriburb in Illinois, describes how the development team formed “with the goal of developing this beautiful 677 acres responsibly, with a total of only 359 single-family homes and 36 condominiums as opposed to 2,400 homes that were planned by another developer” (Prairie Crossing, 2009). This “responsible” development is common to agriburbs, the design of which often begins with the identification of key natural and agricultural resources that should be conserved (McMahon, 2010). Through the preservation of these resources, agriburbs have succeeded at reducing the quantity and contamination level of runoff from the site as well as providing affordable, peri-urban land to small-scale farmers. However, the benefits of agriburban development are less clear when examined from a broader standpoint, beyond the site boundaries. As a result of the approach chosen at Prairie Crossing, the development of an additional 2,005 homes would have been required elsewhere to accommodate the same population. The lower density causes a greater gross area to be impacted by agriburban development than other suburbs. While agriburbs offer many benefits, the low gross density and the impact of nearby development on the preserved natural areas and farmland are considerable drawbacks.

The goal of agriburban development to integrate conservation and development is commendable. Both conservation and development are necessary for the long-term health and sustainability of communities that is sought through planning policies for the GGH. However, the scale at which integration occurs is also important. The Greenbelt Plan states that land use planning within and around the Greenbelt boundaries should be based not only on the designation of a specific site but with consideration of connectivity across boundaries and of the broader agricultural system of southern Ontario. Similarly, the PPS and the Growth Plan call for planning matters related to population growth, natural heritage and resources, and housing to be approached in a coordinated and integrated manner.
Despite the “responsible” and conservation-oriented approach to development, the agriburb scored lower than the new urbanist suburb against all criteria in the sustainability assessment. Overall, the agriburb had an average score of 1 out of 2, compared with 1.67 for the new urbanist suburb. The implementation of this approach on a wide scale would reduce agricultural potential and conservation value, while accommodating a lower population than conventional suburban development. This broad implementation would be clearly contradictory to the position of the PPS which states that sustainable communities are achieved through land use patterns that achieve densities and a mix of land uses that use resources and existing infrastructure efficiently, minimize negative environmental impacts and promote energy efficiency, and are supportive of active transportation and public transit.

6.2 Implications

The findings of this research suggest that the implementation of agriburbs on a broad scale within urban-rural fringe areas of the Greater Golden Horseshoe would be contradictory to the land use policy objectives that have been established for the region. The Greenbelt Plan, Growth Plan, and Provincial Policy Statement support the intense development of settlement areas and the identification and preservation of agricultural and natural resources. Specifically, these directives are called for on a regional scale and in a coordinated manner. While these policies encourage a mix of land uses at a neighbourhood scale, this research has indicated that mixing agricultural and natural lands with residential development reduces agricultural productivity, conservation value, and residential density. Agriburban development fails to provide effective preservation of important resources or efficient residential development at a site level. The sustainability assessment and policy review suggest the broad implementation of this approach would not contribute to the development of sustainable communities in the GGH.

There may, however, be situations where agriburban development could be appropriate on a site level. Agriburbs can reduce residential-agricultural land use conflicts that are common where “hard boundaries” exist between urban development and agricultural land preserves (Newman & Nixon, 2014). The PPS is highly restrictive of the expansion of settlement areas to prime agricultural areas but also states that, should this expansion be unavoidable, impacts on agricultural operations should be mitigated. In such a case, development that incorporates small-
scale, organic agriculture and attracts residents who want to live in an agricultural setting could provide a buffer between more intense development and large-scale agriculture operations. Similar to cases where expansion of settlement areas to prime agricultural areas is required, agriburban development could be appropriate at the fringe of preserved agricultural areas, within settlement areas where density and population targets have been reached. In both cases, implementation of agriburban development on the fringe of permanently protected agricultural land would address shortfalls of agriburbs identified in the sustainability assessment. Such development would not contribute to fragmentation of agricultural land since the portions preserved within the development would be contiguous with the larger preserved area. Additionally, the amenity of agricultural land within the agriburb could not attract further development where adjacent agricultural lands are protected in perpetuity.

6.3 Further Research

In addition to the findings reached, this study has indicated areas for further research to explore. This research was limited by its reliance on secondary data that was not initially gathered for the purposes of the sustainability assessment used or, in most cases, the planning context of the Greater Golden Horseshoe. The implications of agriburban development within the GGH could be explored further through primary data collection on agriburbs focussed on their capacity to meet the planning policy directives of Ontario and the GGH. Additionally, interviews with planning professionals practicing in the GGH, as local and regional planners and as suburban developers, would shed light on current challenges and recent progress relating to the regional planning objectives.

There is also potential for site-specific policies to be created for areas where agriburban development would contribute to local and regional sustainability objectives. Subsequent research could focus on specific municipalities within the GGH to identify areas that have this potential. Additionally, the impact of education on housing preferences and the role this can play in attracting more sustainable suburban development requires further exploration. Finally, the common shortfall of most suburban development in providing insufficient affordable housing options is an urgent issue affecting many regions. Further research should examine how land use
policies in the GGH can provide incentives for developers to incorporate a range and mix of housing in every neighbourhood that represents the spectrum of housing needs in Ontario.

6.4 Conclusion

Today, the public is well informed of global environmental degradation and many citizens support initiatives to preserve natural and agricultural land surrounding the cities they live in. The emergence of agriburbs indicates that a growing number of homebuyers have a desire to preserve these landscapes while also living in them. However, the sustainability assessment conducted in this study indicates that agriburbs are less successful than new urbanist suburbs at meeting sustainability criteria. While agriburban development offers some lessons for how higher density developments can provide quality open space amenities, it does not represent an approach that can be widely replicated to produce sustainable communities.

The findings of this research indicate that regional approaches with hard boundaries, such as the protected countryside in the Greenbelt, are more effective at preserving these lands while promoting intensification and efficient greenfield development. In contrast, agriburban development, which preserves key features at the site level, results in fragmentation, low conservation value, and decreased efficiency. Agriburbs can contribute to planning objectives in the GGH if implemented in a way that is appropriate for the site and consistent with regional policies. These conditions may exist where a buffer is required between more intense development and protected agricultural lands and where such development will not require further greenfield land to be developed to accommodate population and employment targets.

As with conventional suburbs, market demand for agriburbs should not be sufficient argument for their provision. While a range of housing options and neighbourhood environments should be made available to accommodate differing preferences, planners must consider how each development will contribute to sustainable development on a regional level. Further progress can be made through raising public awareness of how our built environment affects our health and the natural environment. This will help align the housing market demand with sustainable community planning approaches.
References


Appendix A
### A.1 Summary Table of Suburb Comparison Using Sustainability Assessment Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-ecological system integrity</td>
<td>Increased destruction of the natural environment</td>
<td>Increased ability to use alternative modes of transportation</td>
<td>Preserves significant portion of land as agricultural or natural</td>
</tr>
<tr>
<td></td>
<td>Increased consumption of fossil fuels</td>
<td>Decreased dwelling size and setbacks</td>
<td>Design can begin with identifying key natural and cultural landscape features</td>
</tr>
<tr>
<td></td>
<td>Increased quantity and contamination of stormwater runoff</td>
<td>Decreased conversion of greenfield land through increased gross density</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Irreversible conversion of agricultural land</td>
<td></td>
<td>Reduces contaminated stormwater runoff</td>
</tr>
<tr>
<td>&gt; “Need to understand better the complex systemic implications of our own activities”</td>
<td></td>
<td>Preserves rural character and history, but in a biased manner</td>
<td></td>
</tr>
<tr>
<td>&gt; “Need to reduce indirect and overall, as well as direct and specific human threats to system integrity and life support viability”</td>
<td></td>
<td>Gross densities comparable to conventional suburbs or less dense</td>
<td></td>
</tr>
<tr>
<td>Livelihood sufficiency and opportunity</td>
<td>Desirable living environment</td>
<td>Inclusion of civic, institutional, and commercial activity</td>
<td>Natural areas are fragmented, results in low habitat conservation value</td>
</tr>
<tr>
<td></td>
<td>Increased leisure physical activity</td>
<td>Increased independence for those who cannot or choose not to drive</td>
<td>Draws residents from central city and older suburbs to less dense, more automobile-oriented neighbourhood</td>
</tr>
<tr>
<td></td>
<td>Increased private property</td>
<td>Increased variety in housing stock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased privacy and social isolation</td>
<td>Increased sense of place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decreased sense of place</td>
<td>Increased sense of place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased automobile-dependency</td>
<td>Increased public space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decreased utilitarian physical activity</td>
<td>Increased possibility for social interaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homogeneous housing stock</td>
<td>Decreased average dwelling size and property setbacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decreased political participation, donating, and volunteering</td>
<td>Decreased private space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased anxiety and depression</td>
<td>Generally poor housing affordability, especially when limited in supply</td>
<td></td>
</tr>
<tr>
<td>Criteria average</td>
<td>0.60</td>
<td>1.56</td>
<td>1.40</td>
</tr>
</tbody>
</table>

### Intragenerational equity

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased leisure physical activity</td>
<td>Increased independence for those who cannot or choose not to drive</td>
<td>Nature and agriculture amenities provide outdoor recreation opportunities</td>
</tr>
<tr>
<td></td>
<td>Increased privacy and social isolation</td>
<td>Increased density to support transit service</td>
<td>Can provide agriculture education opportunities, tradeoff for farm productivity</td>
</tr>
<tr>
<td></td>
<td>Homogeneous housing stock</td>
<td>Decreased dwelling size</td>
<td>Improves affordability of peri-urban farming in areas with prohibitive land costs</td>
</tr>
<tr>
<td></td>
<td>Increased private property</td>
<td>Increased variety in housing stocks intended to increase social diversity and housing affordability</td>
<td>Reduces conflicts between residential and agricultural uses by creating buffer zone of small-scale agriculture and residents seeking agricultural setting</td>
</tr>
<tr>
<td></td>
<td>Contributes to traffic congestion, infrastructure deficiency, and urban deterioration</td>
<td>Increased public space</td>
<td>Preserves rural character and history, but in a biased manner</td>
</tr>
<tr>
<td></td>
<td>Increased automobile-dependency</td>
<td>Increased possibility for social interaction</td>
<td>Decreased housing affordability and concentrates natural amenities in affluent neighbourhoods</td>
</tr>
<tr>
<td></td>
<td>Decreased utilitarian physical activity</td>
<td>Generally poor housing affordability, especially when limited in supply</td>
<td>Natural areas are fragmented, results in low habitat conservation value</td>
</tr>
<tr>
<td></td>
<td>Decreased sense of place</td>
<td></td>
<td>Draws residents from central city and older suburbs to less dense, more automobile-oriented neighbourhood</td>
</tr>
</tbody>
</table>

Criteria average | 0.38 | 1.71 | 1.50 |
<table>
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intergenerational equity</strong> - “Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- “Need to return current resource exploitation and other pressures on ecological systems and their functions to levels that are safely within perpetual capacity of those systems to provide resources and services likely to be needed by future generations”</td>
<td>Increased destruction of the natural environment</td>
<td>Increased ability to use alternative modes of transportation</td>
<td>Preserves significant portion (40-95%) as agricultural or natural</td>
</tr>
<tr>
<td>- “Need to build the integrity of socio-ecological systems, maintain the diversity, accountability, broad engagement and other qualities required for long-term adaptive adjustment”</td>
<td>Increased consumption of fossil fuels</td>
<td>Decreased conversion of greenfield land</td>
<td>Preserves agricultural land and food production close to urban areas</td>
</tr>
<tr>
<td></td>
<td>Increased quantity and contamination of stormwater runoff</td>
<td>Decreased average dwelling size and property setbacks</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Irreversible conversion of agricultural land</td>
<td>Decreased private space</td>
<td>Reduces contaminated stormwater runoff, reduces infrastructure costs</td>
</tr>
<tr>
<td>Criteria average</td>
<td>0.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Resource maintenance and efficiency</strong> - “Provides a larger base for ensuring sustainable livelihoods for all while reducing threats to the long-term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- “Need to do more with less (optimize production through decreasing material and energy inputs and cutting waste outputs through product and process redesign throughout product lifecycles) to permit continued economic expansion where it is needed, with associated employment and wealth generation, while reducing demands on resource stocks and pressures on ecosystems”</td>
<td>Increased private property</td>
<td>Increased density around transit stops to support transit service</td>
<td>Preserves significant portion (40-95%) as agricultural or natural</td>
</tr>
<tr>
<td>- “Need to consider purposes and end uses (efficiency gains are of no great values if the savings go to more advantages and more consumption by the already affluent)”</td>
<td>Increased destruction of the natural environment</td>
<td>Increased ability to use alternative modes of transportation</td>
<td>Preserves agricultural land and food production close to urban areas</td>
</tr>
<tr>
<td></td>
<td>Increased consumption of fossil fuels</td>
<td>Decreased conversion of greenfield land</td>
<td>Aims to encourage biodiversity and preserve habitat</td>
</tr>
<tr>
<td></td>
<td>Inefficient use of existing infrastructure</td>
<td>Decreased average dwelling size and property setbacks</td>
<td>Reduces contaminated stormwater runoff, reduces infrastructure costs</td>
</tr>
<tr>
<td></td>
<td>Irreversible conversion of agricultural land</td>
<td>Decreased private space, increased public space</td>
<td>Net densities of built areas can range widely from that of traditional neighbourhoods to estate lots</td>
</tr>
<tr>
<td></td>
<td>Increased quantity and contamination of stormwater runoff</td>
<td>Decreased conversion of greenfield land through increased gross density</td>
<td>Design can begin with identifying key natural and cultural landscape features – if considered late, farming productivity is negatively impacted</td>
</tr>
<tr>
<td>Criteria average</td>
<td>0.00</td>
<td>2.00</td>
<td>1.20</td>
</tr>
<tr>
<td><strong>Socio-ecological civility and democratic governance</strong> – “Build the capacity, motivation and habitual inclination to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- “Need governance structures capable of integrated responses to complex, intertwined and dynamic conditions”</td>
<td>Increased privacy and social isolation</td>
<td>Increased sense of place</td>
<td>Reduces conflicts between residential and agricultural uses by creating buffer zone of small-scale agriculture and residents seeking agricultural setting</td>
</tr>
<tr>
<td>- “Need to strengthen individual and collective understanding of ecology and community, foster customary civility and ecological responsibility, and building civil capacity for effective involvement in collective decision making”</td>
<td>Decreased sense of place</td>
<td>Increased possibility for social interaction</td>
<td>Can provide agriculture education opportunities, tradeoff for farm productivity</td>
</tr>
<tr>
<td></td>
<td>Decreased political participation, donating, and volunteering</td>
<td>Increased public space and opportunities for community life</td>
<td>Increased sense of place and community</td>
</tr>
<tr>
<td>Criteria average</td>
<td>0.00</td>
<td>2.00</td>
<td>1.80</td>
</tr>
</tbody>
</table>
</table>
### Precaution and adaptation – “Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise and manage for adaptation.”

- Increased destruction of the natural environment
- Increased consumption of fossil fuels
- Increased quantity and contamination of stormwater runoff
- Irreversible conversion of agricultural land

#### Criteria average

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conventional suburb</th>
<th>New urbanist suburb</th>
<th>Agriburb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precaution and adaptation</td>
<td>0.00</td>
<td>1.67</td>
<td>1.00</td>
</tr>
<tr>
<td>Total average</td>
<td>0.14</td>
<td>1.80</td>
<td>1.29</td>
</tr>
</tbody>
</table>

### Immediate and long-term integration – “Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”

- Greatest environmental destruction
- Low energy and resource efficiency
- Detrimental health and social impacts
- Homogenous housing stock

#### Immediate and long-term integration – “Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”

- Most efficient use of land, energy, and resources
- Less desirable form, but offers benefits to residents
- Limited affordable housing options

#### Immediate and long-term integration – “Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”

- Preservation of peri-urban farmland and other natural amenities
- Conservation and development efforts can be contradictory and counter-productive
- High demand and homogenous housing stock

### Immediate and long-term integration – “Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”

- Need positive steps in all areas, at least in general and at least in the long term

### Immediate and long-term integration – “Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.”

- Need to resist convenient, immediate compromises unless they clearly promise an eventual gain
Appendix B
## B.1 Provincial Policy Statement – Summary of relevant sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Policy No.</th>
<th>Relevant statements (paraphrased)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing and Directing Land Use</td>
<td>1.1.1</td>
<td>Healthy and sustainable communities are achieved through efficient development and land use patterns and include an appropriate range and mix of residential, employment, institutional, and open space uses to meet long-term needs</td>
</tr>
<tr>
<td></td>
<td>1.1.3</td>
<td>Settlement areas, including built-up and designated growth areas, will be the focus of growth and development; land use patterns should achieve densities and mix of land uses that use resources and existing infrastructure efficiently, minimize negative environmental impacts and promote energy efficiency, and are supportive of active transportation and public transit; settlement areas shall only be expanded to prime agricultural areas when there are no reasonable alternatives and, if this occurs, impacts on agricultural operations should be mitigated</td>
</tr>
<tr>
<td></td>
<td>1.1.4</td>
<td>Rural areas should be supported by leveraging rural amenities and assets, accommodating a range of housing in rural settlement areas, conserving and redeveloping existing housing, and conserving biodiversity</td>
</tr>
<tr>
<td></td>
<td>1.1.5</td>
<td>Rural lands should be used for minimal residential development that is compatible with the landscape and sustained by rural services; agricultural and resource-related uses should be promoted on rural lands while non-related development should be located to minimize constraints on these</td>
</tr>
<tr>
<td>Coordination</td>
<td>1.2.1</td>
<td>Planning matters should be approached in a coordinated and integrated manner when addressing the management of population and employment growth, natural heritage and resources, and housing</td>
</tr>
<tr>
<td></td>
<td>1.2.6.1</td>
<td>Sensitive land uses should be appropriately buffered and/or separated from major facilities to mitigate adverse effects</td>
</tr>
<tr>
<td>Housing</td>
<td>1.4.3</td>
<td>In order to provide an appropriate range and mix of housing, planning authorities shall permit and facilitate all forms of housing required to meet the requirements of current and future residents; direct the development of housing to appropriate locations with available infrastructure and services; and promote densities for new housing which efficiently use land, resources, infrastructure, and services and support the active transportation and public transit</td>
</tr>
<tr>
<td>Category</td>
<td>Objective</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Public Spaces, Recreation &amp; Parks</td>
<td>Healthy and active communities should be promoted with public streets and spaces that foster social interaction and facilitate active transportation; a range of publicly-accessible, built and natural settings for recreation should be provided and equitably distributed negative impacts on parks, conservation reserves, and other protected areas should be minimized</td>
<td></td>
</tr>
<tr>
<td>Long-Term Economic Prosperity</td>
<td>The availability and use of land, resources, and infrastructure should be optimized; built form, cultural planning, and conservation should be used to encourage a sense of place; a multimodal transportation system should be supported; opportunities to support local food and the sustainability of agri-food and agri-product businesses should be provided by protecting agricultural resources and minimizing land use conflicts</td>
<td></td>
</tr>
<tr>
<td>Natural Heritage</td>
<td>Natural features and areas should be protected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diversity, connectivity, and long-term ecological function of natural heritage systems should be maintained and, where possible, improved</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>The quality and quantity of water resources should be protected by conducting integrated and long-term planning at the watershed-scale and considering cumulative effects of development; stormwater management practices should minimize volumes and contaminant loads and make use of vegetative and pervious surfaces</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>Prime agricultural areas should be protected for long-term use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permitted uses will be limited in prime agricultural areas so as to not hinder agricultural operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lot creation in prime agricultural areas is discouraged and can only occur under specific circumstances</td>
<td></td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Significant heritage (built and cultural) should be conserved</td>
<td></td>
</tr>
</tbody>
</table>
## B.2 Greenbelt Plan – Summary of relevant sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Policy No.</th>
<th>Relevant statements (paraphrased)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agricultural System</strong></td>
<td>3.1.3.2</td>
<td>Prime agricultural areas: agriculture and related uses are supported within these areas; cannot be redesignated for non-agricultural uses except where permitted under sections 3.4 and 5.2</td>
</tr>
<tr>
<td></td>
<td>3.1.4.5</td>
<td>New multiple units or multiple lots for residential dwelling are not permitted in rural areas</td>
</tr>
<tr>
<td></td>
<td>3.1.4.6</td>
<td>New land uses (including creation of lots as permitted in the Plan) and expanding livestock facilities must comply with minimum distance separation requirements</td>
</tr>
<tr>
<td></td>
<td>3.1.5</td>
<td>Land use planning within and around the Greenbelt boundaries should consider connectivity across Plan boundaries and relation with the broader agricultural system of southern Ontario</td>
</tr>
<tr>
<td><strong>Parkland, Open Space &amp; Trails</strong></td>
<td>3.3.2</td>
<td>Collaboration should occur between provincial and local governments and other agencies to facilitate the development of publicly accessible parkland, open space, and trails for recreation activities and to support the connectivity of natural heritage</td>
</tr>
<tr>
<td><strong>Settlement Areas</strong></td>
<td>3.4.2.1</td>
<td>Towns and villages (in the Protected Countryside and within approved boundaries) that pre-existed the Plan are governed by their municipal official plans are not subject to Greenbelt policies</td>
</tr>
<tr>
<td></td>
<td>3.4.2.2</td>
<td>Municipalities should support long-term vitality of towns and villages in the protected countryside through development approaches of intensification and revitalization, including modest growth that is within local infrastructure capacity</td>
</tr>
<tr>
<td></td>
<td>3.4.2.3</td>
<td>Settlement areas cannot expand into the Greenbelt from outside of it</td>
</tr>
<tr>
<td></td>
<td>3.4.2.5</td>
<td>Modest settlement area expansions may be possible for towns and villages during the 10-year Plan review period; proposed growth would need to be on existing municipal services, within water production capacities of the watershed, and not extend into natural heritage or specialty crop areas</td>
</tr>
<tr>
<td>The Protected Countryside</td>
<td>4.1.1</td>
<td>Generally, non-agricultural uses are not permitted in specialty crop or prime agricultural areas in the Protected Countryside; proposals for non-agricultural uses must show that the use is appropriate for the location, that the proposed servicing is appropriate for the use, and there are no negative impacts on key natural heritage features or the biodiversity and connectivity of the Natural Heritage System</td>
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<td></td>
<td>4.4.2</td>
<td>Cultural heritage resources should be identified and protected to benefit the local community and contribute to achieving the vision and goals of the Plan</td>
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<td></td>
<td>4.6</td>
<td>Lot creation in the Protected Countryside is permitted only for the range of uses identified in the Plan such as agricultural and agriculture-related uses, and natural heritage conveyances to public bodies or non-profits</td>
</tr>
</tbody>
</table>
### B.3 Growth Plan for the Greater Golden Horseshoe – Summary of relevant sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Policy No.</th>
<th>Relevant statements (paraphrased)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where and How to Grow</td>
<td>2.2.2</td>
<td>Growth will be accommodated by intensification of built-up areas, building compact communities in designated greenfield areas, developing mixed-use and multimodal environments, developing cities and towns into complete communities, limiting growth in areas that do not offer municipal water and wastewater systems, and prohibiting the establishment of new settlement areas</td>
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<td></td>
<td>2.2.3</td>
<td>40% of all residential development should be within the built-up area</td>
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<td>2.2.7</td>
<td>Development in designated greenfield areas will be planned to achieve a minimum density target no less than 50 residents and jobs combined per hectare, contribute to the creation of complete communities, support active transportation and transit, provide a mix of land uses, and provide quality public open spaces</td>
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<td>2.2.8</td>
<td>Settlement area boundaries will only be expanded through a municipal comprehensive review that demonstrates that</td>
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<td>- forecasted growth cannot be accommodated through intensification targets and designated greenfield areas;</td>
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<td>- the expansion will not prevent the achievement of intensification and density targets;</td>
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<td>- the expansion meets the requirements of other provincial land use plans</td>
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<td>- the infrastructure required for the expansion can be provided in a sustainable manner</td>
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<td>- the impacts from expansion on nearby agricultural operations are mitigated to the extent feasible; and</td>
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<td>- in prime agricultural areas, no reasonable alternatives exist</td>
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<td></td>
<td>2.2.9</td>
<td>In rural areas, residential development will occur in settlement areas</td>
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<tr>
<td>Infrastructure to Support Growth</td>
<td>3.2.5</td>
<td>New or expanded water and wastewater systems should only be considered where strategies for water conservation and demand management are being implemented, and where new services will serve growth that supports the achievement intensification and density targets</td>
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<td></td>
<td>3.2.6</td>
<td>Growth planning will consider existing and planned infrastructure so that it can be provided efficiently and effectively</td>
</tr>
<tr>
<td>Protecting What is Valuable</td>
<td>4.2.2</td>
<td>Municipalities should provide opportunities for, maintain, and improve farm-related infrastructure such as drainage and irrigation; municipalities should establish agricultural advisory committees and work with these committees on decision-making related to agriculture and growth management</td>
</tr>
<tr>
<td></td>
<td>4.2.4</td>
<td>Municipalities will create official plans policies and other strategies that support water conservation, energy conservation, and cultural heritage conservation</td>
</tr>
</tbody>
</table>